

Bryozoa from Franz-Josef Land, collected by the Jackson-Harmsworth Expedition, 1896-1897. By ARTHUR WILLIAM WATERS, F.L.S.

[Read 15th March, 1900.]

(PLATES 7-12.)

### CHILOSTOMATA.

THE Arctic Bryozoa from various localities have been well studied, having received attention from several leading workers, including Smitt, Busk, Hincks, Lorenz, Vigelius, &c. That they should have been so thoroughly examined is no doubt accounted for by the fact that, when any important expedition returns, specialists are found to work up all the material collected under trying circumstances, while collections from less accessible places are put aside without description.

The question arises what should be considered Arctic, for the Arctic circle forms but an artificial zoological division, and it would be simpler to include in "Arctic" everything within the isothermal line of 32° F. (0° C.). This brings in practically the whole of Greenland, Davis Straits, Labrador, and Iceland. The Gulf of St. Lawrence is not included; but as many Bryozoa have been described from there, and seeing that many of them occur in Arctic regions, they must be compared. If we were to take the winter isotherm, the Gulf of St. Lawrence would be included in a line passing through the south of Greenland, and by the island of Jan Mayen.

A small collection of 19 species, brought by Leigh Smith from Franz-Josef Land, was described by Ridley<sup>1</sup>.

The most important works for determining the northern Bryozoa are Smitt's series<sup>2</sup> of valuable papers published in the Proceedings of the Swedish Academy; and when examining Arctic forms we appreciate the thoroughness of his labours, although now attention is paid to several characters which were not then used, and material progress has been made in classification. Besides his papers on the Scandinavian forms, he published a descriptive list<sup>3</sup> of 58 species collected by

<sup>1</sup> "Polyzoa, Coelenterata, and Sponges of Franz-Josef Land," Ann. Mag. Nat. Hist. ser. 5, vol. vii, p. 442, pl. xxi.

<sup>2</sup> F. A. Smitt. "Krit. Förteck. öfver Skand. Hafs-Bryozoer," Öfversigt af K. Vet.-Akad. Förhandl. 1865-1871 (referred to as "Krit. Fört.").

<sup>3</sup> Öfversigt K. Vet.-Ak. Förh. 1878, p. 11.

Nordenskiöld, Stuxberg, and Théel from Novaya Zemlya and the mouth of the Jenisei; and another list<sup>1</sup> of the collection of 74 species made by Sandberg and Trybom from the Kola peninsula. Further<sup>2</sup>, Smitt's "Bryozoa marina in regionibus arcticis et borealibus viventia recensuit" gives a valuable *résumé* of what was then known.

The late Mr. Hincks<sup>3</sup> published a paper on "Iceland and Labrador Polyzoa;" and the same author's papers<sup>4</sup> on the Bryozoa from the Gulf of St. Lawrence give exact descriptions and figures of various Arctic species. Mr. Hincks furnished the list of species from Barents Sea in W. S. M. D'Urban's paper<sup>5</sup> "Zoology of Barents Sea," and described some new species in the same volume of the 'Annals,' p. 272.

Busk<sup>6</sup> described some Bryozoa collected from Greenland, &c. by Dr. Sutherland and S. E. Belcher; and the next year had a paper in the 'Annals'<sup>7</sup> on a collection made by Mr. McCAndrew on the coasts of Norway and Finland. The same author published<sup>8</sup> in 1881 a description of Arctic Bryozoa collected by Captain Feilden.

An Austrian expedition, sent out by Count Wilczek to the island of Jan Mayen, north of Iceland, collected 75 species, which were ably described by L. Lorenz<sup>9</sup>. G. Levinsen<sup>10</sup> has written a valuable paper on 51 species of Bryozoa from the Kara Sea.

Vigehus<sup>11</sup> has a list of 27 species collected by the 'Willem Barents.'

<sup>1</sup> Öfversigt K. Vet.-Ak. Förh. 1878, p. 19.

<sup>2</sup> *Ibid.* 1867, p. 443.

<sup>3</sup> Ann. & Mag. Nat. Hist. ser. 4, vol. xix. p. 97. Mr. Hincks afterwards found that instead of coming from Iceland the species so named were from Davis Straits.

<sup>4</sup> *Ibid.* ser. 6, vol. i. p. 214, & vol. ix. p. 149.

<sup>5</sup> *Ibid.* ser. 5, vol. vi. p. 257.

<sup>6</sup> Quart. Journ. Micr. Sc. vol. iii. 1855, p. 253.

<sup>7</sup> Ann. & Mag. Nat. Hist. ser. 2, vol. xviii. p. 32.

<sup>8</sup> Journ. Linn. Soc., Zool. vol. xv. p. 231.

<sup>9</sup> "Bryozoen von Jan Mayen." Oesterreichische Polarstation Jan Mayen. Beobachtungs-Ergebnisse, vol. iii. p. 83, 1886: Internat. Polarforschung.

<sup>10</sup> "Bryozoen fra Kara-Havet," Dijnphna-Togtets Zool.-Bot. Udbytte, 1886, p. 307.

<sup>11</sup> "Catalogue of the Polyzoa coll. during the Dutch N. Polar Cruise of the 'Willem Barents' in the year 1878-1879," Nied. Arch. für Zool., Suppl. vol. iii.

Kirchenpauer<sup>1</sup> has described Bryozoa from East Greenland; Andeer Hennig<sup>2</sup> 27 species from West Greenland; and Nordgaard<sup>3</sup> has published a useful paper on the Bryozoa from the coasts of Norway, in which he gives a list of Arctic literature, to which I would specially call attention, as there are several papers by M. Sars, G. O. Sars, Kirchenpauer, Danielssen, and others to which the worker may have to refer, but which need not be enumerated here.

Stuxberg<sup>4</sup> has given a valuable list from the district of Novaya Zemlya; but when the older nomenclature is used we cannot always be certain what was intended, and may have two names for the same form: for instance, *Leieschara subgracilis* = *Myrionozoum subgracile*.

Recently Olaf Bidentkap<sup>5</sup> has written an important paper on the Bryozoa from East Spitzbergen.

E. von Marenzeller<sup>6</sup> named twelve Bryozoa dredged by the Austrian North Pole Expedition, and a few of these are from localities a degree or two farther east than any of the Jackson-Harmsworth dredgings, though not so far north, and most are from a depth of about 200 metres. In order to better understand the manner in which distribution has taken place, we now want collections from the neighbourhood of New Siberia and the Behring Straits.<sup>7</sup>

Smitt, who described so many Arctic forms, undoubtedly often united under one name quite distinct species, and much time is lost in considering which are correct specific names. The difficulty is increased by so many species being based, by many authors, originally upon the form of growth, without any

<sup>1</sup> "System. Verzeich. der in Ostgrönland gesammelten Hydroiden u. Bryozoen" in Koldewey, 'Die zweite deutsche Nordpolfahrt,' Bd. II. Abth. 1, 1874, p. 411.

<sup>2</sup> "Bryozöer från Westgrönland samlade af Dr. Ohlin 'under the Peary Auxiliary Expedition,' år 1894." Cefvers. K. Vetensk.-Akad. Förh. 1896.

<sup>3</sup> "Syst. fortæg. ov. de i Norge, hidtil observ. arter af Marine Polyzoa," Bergens Museums Aarbog 1894-5, No. 2.

<sup>4</sup> "Faunan på och kring Novaja Semlja, Vega-Expeditionens," Vetenskaplige Arbeten, vol. v. 1887, pp. 100, 117, & 179.

<sup>5</sup> "Bryozoen von Ost-Spitzbergen," Zool. Jahrb. vol. x. 1897, p. 609, pl. 25.

<sup>6</sup> "Die Coelent., Echin. u. Würmer der k.-k. Oest.-Ung. Nordp.-Exp.," Denksch. Akad. Wissensch. Wien, xxxv. p. 388.

<sup>7</sup> Since my paper was read an important contribution has been published by O. Nordgaard on "Polyzoa," collected in the North Atlantic, in the Reports of the Norske Nordhavs-Expedition, 1867-1878, pt. xxvii.

adequate descriptions of the zoëcia or of the minute characters. The name is accepted, and subsequently more detailed description has been given, though there is the possibility of this only relating to a similar form. We have an example in *Cellepora incrassata* of Lamarck, the name being first given to a Mediterranean species; but under this name Smitt described more thoroughly a northern form, which has been thus generally known, while a Mediterranean one has been described under another name. In such a case it seems better to consider this as the species of Smitt, who more fully described it; and to replace the present recognized name by another would only add confusion, and this is often the result of too pedantically endeavouring to follow rules.

In many cases, purposely, only one or two references are given, even where the name has been employed by various authors; but, as far as possible, only descriptions about which there was a reasonable certainty have been referred to, leaving out probabilities.

Since Smitt published his papers, the details of the structure of the zoëcia have been more carefully examined, and it has been necessary to give attention to many points which are now recognized as furnishing specific characters, for it is known that the general appearance is subject to great variation. The use of the opercula and mandibles in determining species, which I introduced in 1878\*, has been most valuable, and these characters are receiving increasing attention. The ovicells are more carefully examined than they were at the time Smitt began his work. The position and form of the rosette-plates should always be examined when circumstances permit; as also whether the connection is direct from zoëcium to zoëcium, or through a pore-chamber †.

The position of the rooting process is another character of considerable value. In the Cyclostomata the position and nature of the "closures" are characters which should not be overlooked. The glands at the side of the oral aperture and in the avicularian chamber differ considerably in position and size according to the species, and there are many species which I should recognize from sections of the soft parts; and no doubt, as

\* "The Use of the Opercula in the Determination of the Cheilostomous Bryozoa," Proc. Manch. Lit. & Phil. Soc. 1878, vol. xviii. p. 8, pl. i.

† See Waters, "Observations on Membraniporidae," Linn. Soc. Journ., Zool. vol. xxvi. p. 654.

time advances, such sections will be more largely employed, and then internal organs may prove as useful in classification as the outside shell.

The number of tentacles \*, although subject to a small range, should always be given ; while a more general acquaintance with the primary cell may cause a modification of views.

The collection under review, which is one of considerable importance, was sent to me in 1898, but until other work was finished it was impossible to devote myself seriously to the task. Since then sections have been cut in all cases where the material was at all suitable, slides of the opercula and mandibles of most species have been prepared, and calcareous sections of a few have been made. The collection was sent to me by Mr. Bruce, the naturalist on the Expedition, by whom a large part of the material was collected in 1897 ; and I take this opportunity of thanking Mr. Bruce for his kindness in entrusting me with the examination of the Bryozoa.

It will be well to separate the Bryozoa into four divisions, namely :—

No. 1. Those from the neighbourhood of Northbrook Island, where the Expedition wintered. The localities are Günther Sound, Cape Flora, off Elmwood, off glacier between Cape Flora and Cape Gertrude.

No. 2. Near Wilczek Land, 127 fathoms.

No. 3. Lat.  $77^{\circ} 55' N.$ , long.  $55^{\circ} 25' E.$ , 115 fathoms ; lat.  $77^{\circ} 55' N.$ , long.  $53^{\circ} 20' E.$ , and  $53^{\circ} 16' E.$ , 130 fathoms. These, and also those collected from No. 2, were dredged by the 'Windward' on its third journey to Franz-Josef Land. These last are interesting as extending our knowledge of the Bryozoa farther to the east ; for, with the exception of a few specimens described by Marenzeller, no Bryozoa have been mentioned from any locality so far eastward. A further interest attaches to this part of the collection, as Mr. Bruce informs me that they were collected by Captain Brown and Mr. Edward Else, the steward, to whom Mr. Bruce had, on a previous occasion, shown the method of collecting with a "swab" and had instructed them in the preservation of the material. This shows how much useful

\* The tentacles can be readily counted in transverse sections, and figures obtained from sections are more reliable than those from living specimens.

collecting may be done in out of the way regions by men who are not trained zoologists.

No. 4. Off Cape Mary Harmsworth, 53–93 fathoms, and 234 fathoms. This is the most northerly locality whence Bryozoa have been described.

In this paper special consideration has been given to the question of geographical distribution; and we find that most of the species are widely, in fact generally, distributed in the Arctic regions, forming a very distinct Arctic fauna, with a large proportion only found in the northern seas.

Out of the 59 species of Chilostomata, *Hippothoa hyalina* is cosmopolitan, being found in the Southern hemisphere. *Porella concinna* may have been found in the Southern hemisphere, but of this I have some doubt. Then we have the *Escharoides Sarsii*, Sm., and *Cribrilina punctata*, Hass., said to have been dredged in the Antarctic by the 'Erebus' and 'Terror'; and to these I have alluded at some length, and expressed my opinion as to the probability of a mistake in labelling having been made.

There are only 20 species common to the British coasts, including some from the Shetland Islands; and the strikingly small number of 5 also known from the Mediterranean.

When the Cyclostomata and Ctenostomata have been described, the total number will be over 70; but this must not be looked upon as a complete list of Bryozoa from Franz-Josef Land, and I am convinced that many more encrusting species will be found upon dead shells.

In this paper reference is made to work previously done in the Arctic seas, and some species not found by this Expedition are given.

A point which is now attracting attention is, what species occur in the colder regions of the two hemispheres, and before long the expeditions being sent to the Antarctic will help to settle some uncertain points. Sir John Murray, in his \* "Marine Fauna of the Kerguelen Region of the Great Southern Ocean," gives a list of 16 species of Bryozoa from the Northern and Southern Hemispheres, unrecorded within the tropics; but on a critical examination this list, compiled from Busk's 'Challenger' Report, is much reduced.

\* Trans. Roy. Soc. Edin. vol. xxxviii. p. 454.

CRIBRILINA MONOCEROS, Busk, is given from Station 253, from a depth of 3125 fathoms; but my attention has been called to the fact that at this depth the calcareous shell would have been dissolved, and probably a mistake has been made in labelling.

BEANIA MAGELLANICA, Busk, has a very wide distribution, and has not yet been found near the Arctic regions; but, on the other hand, occurs in the Tropics, off Cape Verd, thus removing it from the list.

ESCHAROIDES VERRUCULATA, Busk, collected by the 'Challenger' from Heard Island, I have again examined, and find it is the *Rhynchopora longirostris*, Hincks, and not the same as the *Cellepora verruculata*, Smitt, from Florida.

In my paper on Membraniporidæ\* I showed that MEMBRANIPORA CRASSIMARGINATA, var. INCRUSTANS, Busk, so far as concerned one specimen, was *M. lineata*, L.; another specimen was what I have named *M. incrustans*; while one poor specimen probably is *M. crassimarginata*, H.; and if this is the case, then the distribution thereof is Naples, Capri, Villefranche-sur-Mer, Madeira, Tizard (China Sea) (*Kirkpatrick*), Tristan da Cunha (*Chall.*), and a variety from Japan, so that it is confined to temperate seas.

*Membranipora perfragilis*, H., to which some of the 'Challenger' specimens named *crassimarginata* really belong, has a distribution from South to North Australia, on to Japan, and also Heard Island (Indian Ocean), thus occurring in both hemispheres and the tropics.

With regard to MEMBRANIPORA GALATEA, var. *multifida*, Busk, from off the Azores, I came to the conclusion, on an examination some time ago, that this was not correctly placed, but did not make a note of this at the last re-examination of 'Challenger' specimens. I have not critically examined the KINETOSKIAS CYATHUS, W. Thoms., but the two localities of the 'Challenger' are in temperate seas, not far from the tropics.

The less we say about the Cyclostomata the better, as there is much uncertainty about their determination, and without good specimens with well-preserved ovicells we may go astray, and many of the 'Challenger' determinations had to be made from single and not very satisfactory specimens. The "HORNERA LICHENOIDES," Pont., from the South Atlantic, off the River Plate, has very pronounced ridges with ribs across, and it

\* Journ. Linn. Soc., Zool. vol. xxvi. p. 686.

would be advisable to examine and make sections of some well-preserved specimens.

The "IDMONEA ATLANTICA," Forbes, from off Simon's Bay, S. Africa, does not seem to me to be this species, and the small piece from Kerguelen is also open to doubt.

With regard to ENTALOPHORA, there is so much uncertainty about their determination, that attaching a name sometimes merely means that no characters are found by which separation can be made; also no doubt these simpler forms are older, and have a wider distribution than some of the more highly differentiated.

In the present paper the genus *Scrupocellaria* is enlarged to include one or two species previously placed under *Menipea*, a genus which has incorporated some rather divergent forms.

The *Schizoporella hyalina*, L., is considered to belong to *Hippothoa*, on account of the reproductive characters.

The genus *Porella* is well represented in the Arctic Seas; and in this genus the opercula and mandibles are found of great use in separating the species, and the large avicularian and oral glands may be found similarly useful.

The *Eschara elegantula* of d'Orbigny is found, upon a comparison of d'Orbigny's specimen, not to be identical with Smitt's *Eschara elegantula*, which is in consequence left as *Porella saccata*, Busk.

The Arctic genus *Rhanphostomella*, Lorenz, has a more or less triangular or oval avicularium in the peristomial elevation, and usually has a denticle in the oral aperture. It seems more nearly related to *Smittia* than to *Cellepora*.

The *Celleporæ* all belong to the group separated off as *Osthimosia* by Jullien, and *Schismopora* by MacGillivray. Of the *Reteporæ*, one is purely Arctic and the other is thought to be the same as a Mediterranean species.

#### 1. GEMELLARIA LORICATA (L.). (Pl. 7. fig. 4.)

A specimen from Günther Sound, 10 fath., shows that there are creeping stolons, which at short intervals have adnate zoëcia somewhat resembling those of *Pyripora catenularia*, Jameson. The erect branches may for a time be simple tubes, or they may at once take the usual biserial form. I cannot agree with Mr. Hincks when he speaks of the shoots rising from bundles of fibres, as this is rather reversing the case, for from individual mature zoëcia radicle fibres are produced which unite



into a bundle. I find 13 tentacles, while Van Beneden and Farre speak of 10, Sars 12, Dalyell 12-14, and Vigelius 12.

*Loc.* This is a northern form, ubiquitous in the Arctic, and occurring off the British Isles and the coast of France.

Jackson-Harmsworth Exp.: Günther Sound, 10 fath.; off Cape Gertrude, 30 fath.; nr. Wilczek Land, 127 fath.; lat. 77° 55' N., long. 53° 20' E., 130 fath.; off Cape Mary Harmsworth, 53-93 fath., and 50 miles N.W. Cape Mary Harmsworth, 234 fath.; off glacier between Cape Flora and Cape Gertrude, 30 fath.; Cape Flora off West Bay, 8 fath.

## 2. *BRETTIA FRIGIDA*, sp. nov. (Pl. 7. figs. 1-3.)

There are two species of *Brettia* collected by the Expedition, and this one may be what Smitt figured, pl. xviii. fig. 27, and which is referred to on page 292, *Øfvers. Vetensk.-Ak. Förhandl.* 1867, under *Bugula quadridentata*. In the explanation of the plates it is called an *Eueratea*-growth of *B. quadridentata* from Spitzbergen, 20 fathoms, but the growth is different from that of *Bugula*.

The zoarium grows to about three-quarters of an inch high.

The zoœcia are unilateral, growing from the dorsal surface, with one distal or central rosette-plate and two lateral (fig. 3). The fresh branches arise at intervals of one, two, or three zoœcia; and the two new zoœcia do not spread out much, but at first are usually nearly parallel, the one growing from slightly lower down than the other. The area is surrounded by a raised border, and occupies more than half of the length of the zoœcium. Sometimes a very minute spine can be seen at the oral end on one side, but more frequently no trace is visible. The radicle tubes grow from the distal end. There are 22 tentacles.

The area is quite similar to that of *Bugula*, but in most *Bugulæ* there is a row of distal rosette-plates, though *B. Murrayana*, Johnst., has connections like those of *Brettia frigida*. This latter resembles *Maplestonia simplex*, MacG., in some particulars, but there are no annulated joints. In *Brettia*, as first defined, there are marginal spines; but Busk, in the 'Challenger' Report, describes from Station 196 (North of Australia) *B. australis*, B., without any spines. The *B. cornigera*, Busk, is similar in shape to the present form, but has 4 submarginal spines. Busk undoubtedly is incorrect when he says "springing from a common stem of radicle tubes," for in the Bryozoa the radicle tubes always grow from the mature zoœcia. Ovicells are unknown

in *Brettia*. Hincks made a genus *Corynoporella* for a species somewhat similar to the present, but with an articulated avicularium at the side of the aperture. Probably the genus is superfluous.

*Loc.* Off Cape Mary Harmsworth, 53-93 fathoms; Cape Flora off West Bay, 8 fath.; lat. 77° 55' N., long. 53° 20' E., 130 fath.

### 3. BRETTIA MINIMA, sp. nov. (Pl. 7. figs. 5-7.)

The zoëcia are longer and more delicate than in *B. frigida*, W., and the area occupies about one-third of the length of the zoëcium. The branching takes places frequently, with an interval of one or two zoëcia, and spread out at a considerable angle, nearly at a right angle, much in the same way as in *Alysidium Lafontii*, Aud., so that *B. minima* can be distinguished from *B. frigida* without a lens.

The radicles start from the dorsal surface at the distal end.

*Loc.* Jackson-Harmsworth Exp.: Cape Mary Harmsworth, 53-93 fathoms.

### 4. BUGULA MURRAYANA, *Johnst.*

From Franz-Josef Land there are specimens of characteristic *B. Murrayana*, and others of characteristic *B. fruticosa*, Pack.; but there are many intermediate forms which make separation difficult, though perhaps there are other characters not yet noticed by which they can be distinguished.

A typical specimen from off Cape Mary Harmsworth has about six marginal spines on each side, larger avicularia to the marginal zoëcia; the central avicularia are shorter than in the *fruticosa* variety. The branches are composed of 6 or more zoëcia to a row. Another specimen from the same locality has 3-4 zoëcia to a row, marginal avicularia and a few marginal spines, some zoëcia having none. A small fragment also from the same place has 8-9 marginal spines. This is in a uni-bilateral condition, but is probably torn from a larger piece.

From near Wilczek Land, 127 fathoms, there is a *Bugula* with marginal avicularia, no bordering spines, two pairs of distal spines. The branches are not broad, and the zoëcia are often but loosely attached, and in several cases a zoëcium grows out laterally from the radicular disk. In one or two cases a tubular growth springs from the distal end of the zoëcium, and from the end of this elongated tube grows an ordinary zoëcium. In

most respects this resembles *B. Murrayana*, but in others it is like var. *fruticosa*.

Sections of a specimen from off Cape Mary Harmsworth showed 21 tentacles, whereas a specimen of var. *fruticosa* from off West Point gave 17 tentacles; specimens from Greenland of *B. Murrayana typica* had 18-20 tentacles. In this and the variety there are two lateral rosette-plates, and one distal plate with numerous pores.

In *Bugula* the rule is a row of small rosette-plates\* near the distal border, and from the entirely different mode of connection it is possible that this species will be ultimately removed from *Bugula*. In *Bugula* it is not usual for the avicularia to be median. The *Bugula hexacantha*, Ortmann, from Japan would seem to be *B. Murrayana*.

*Loc.* British seas, Scandinavia, Finland, Spitzbergen, Greenland, Barents Sea, Novaya Zemlya, Jan Mayen, Franklin Pierce Bay, lat. 79° 29' N. Japan?

Jackson-Harmsworth Exp.: Cape Mary Harmsworth, 53-93 fathoms.

##### 5. *BUGULA MURRAYANA*, var. *FRUTICOSA*, *Packard*.

In this variety the branches of the zoarium are usually narrower than in typical *B. Murrayana*, the marginal spines are absent, and the oral ones are often very slightly developed. There are no marginal avicularia, and the central ones are usually much less numerous than in typical *B. Murrayana*.

A specimen from off West Point, Northbrook Island, has two oral spines on each side, avicularia placed centrally below the area of the zoëcia, but no marginal avicularia. There are 17 tentacles.

Another specimen from the same place, also from 2-3 fathoms, consists of four or more rows of zoëcia. The outer zoëcia have one outer spine, while the inner zoëcia have two pairs of oral spines.

A specimen from off Cape Gertrude, 30 fathoms, has two small spines on the outer side of the zoëcia, and one on the inner. There are no avicularia in this specimen.

*Loc.* Spitzbergen, Finland, Kara Sea, Davis Straits, Labrador, Gulf of St. Lawrence; Franz-Josef Land, lat. 79° 55' N., long. 51° 0' E. (*Ridley*).

\* See Levinsen, *Danske Dyr* (Mosdyr), pl. i. f. 40.

Jackson-Harmsworth Exp.: off Northbrook Island, 2-3 fath.; off Cape Gertrude, 30 fath.

6. *BUGULA HARMSWORTHII*, sp. nov. (Pl. 7. fig. 13, Pl. 8. fig. 1.)

The three lower zoëcia retain the primary character and are elongate, tubular, slightly trumpet-shaped, expanding upwards; aperture terminal with ten spines round the margin, two radicles arising from near to the base. The mature zoëcia are biserial, have two spines at each corner, an area covering about two-thirds of the front of the zoëcium, and a large avicularium placed a little more than a quarter of the length of the zoëcium from the top. Ovicell unknown.

This was at first taken for *B. avicularia*, L., but differs in having four spines, the area is shorter, the avicularia are somewhat longer, and the primary zoëcia are not the same. Unfortunately there was only one piece, so that it was not advisable to cut any sections.

Lorenz gives *B. avicularia*, L., from Jan Mayen.

*Loc.* From off Cape Mary Harmsworth, 53-93 fath.

7. *SCRUPOCELLARIA SCABRA* (*Van Ben.*). (Pl. 7. figs. 14-16.)

*Cellarina scabra*, Van Beneden, Bull. Acad. Roy. de Belgique, vol. xv. pt. i. p. 73, figs. 3-6 (1848).

*Scrupocellaria Deliliæ*, Alder, On New Brit. Polyzoa, Micr. Journ. n. s. vol. iv. p. 107 (13), pl. iv. figs. 4-8.

*Cellularia scabra*, Smitt, "Krit. Fört." 1867, pp. 283 & 314, pl. xvii. figs. 27-34.

*Scrupocellaria scabra*, Norman, Q. Journ. Micr. Sc. n. s. vol. viii. p. 214 (3); Hincks, Brit. Mar. Polyz. p. 48, pl. vi. figs. 7-11; id. Ann. Mag. Nat. Hist. ser. 6, vol. iii. p. 427, pl. xxi. fig. 1.

All the Arctic specimens now examined have a very large scutum, resembling in this respect the form described by Hincks from Gaspé Bay (St. Lawrence), and which he says also occurs in Greenland, and it might be an advantage to separate them as a variety from the British forms. There are usually two spines to each zoëcium, but occasionally three, and three spines to the zoëcium at the bifurcation, and there sometimes is one vibraculum on the dorsal surface at the bifurcation. This is, however, often wanting; so that both Levinsen and I have referred to *S. scabra* as without any vibraculum at the bifurcation. In the same way, the large dorsal vibracula are frequently altogether wanting, so that whole colonies may be described as without

vibracula; but when a radicle occurs, and they are not frequent, there is usually a vibracular chamber nearly at right angles to the axis of the zoarium. The seta is broad at the base and is symmetrical. There are 16 tentacles.

In my paper on the *Cellulariidae*, I have shown that *S. scabra* is a northern form and *S. Delilii*, Aud., Mediterranean and from Madeira; and I have been unable to accept some of the synonyms given by Mr. Hincks and Miss Jelly, and there have also been some mistakes in giving the range of localities.

*Loc.* Spitzbergen, 6–150 fath.; Greenland, Finland, Novaya Zemlya, Kara Sea, Jan Mayen, Murman Sea; Franz-Josef Land, lat. 77° 55' N., long. 51° 0' E. (*Ridley*); Kola, Iceland, St. Lawrence (*Hincks*); Norway, North Sea, British seas, Davis Straits.

Jackson-Harmsworth Exp.: nr. Wilczek Land, 127 fath.; off Cape Mary Harmsworth, 53–93 fath.; off Cape Gertrude, 30 fath.

8. SCRUPOCELLARIA TERNATA, var. GRACILIS (*Smitt*). (Pl. 7. fig. 12.)

*Cellularia ternata*, var. *gracilis*, Smitt, "Krit. Fört." 1867, pp. 233 & 305, pl. xvi, figs. 14–24.

*Cellarina ternata*, var. *gracilis*, Verrill, Cont. Zool. Mus. Yale College, no. 43 (fide *Jelly*).

*Menipea gracilis*, Levinsen, Bryoz. Kara-Havet, p. 307 (3); Busk, Journ. Linn. Soc. vol. xv. p. 232.

*Menipea arctica*, Busk, Quart. Journ. Micr. Sc. vol. iii. p. 254, pl. i. figs. 4, 5, 6; Ridley, Ann. Mag. Nat. Hist. ser. 5, vol. vii. p. 444; Lorenz, Bry. von Jan Mayen, p. 83.

*Menipea ternata*, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. x. p. 3; Bidenkap, Bry. von Ost-Spitzbergen, p. 613.

There has been considerable doubt as to the position of this form, for some authors, as Bidenkap, think, after the result of the examination of considerable material, that there should be no separation between *S. ternata* and *S. ternata* var. *gracilis*; others, as Levinsen and Busk, would make two species. Lorenz gave a table showing how his *S. arctica* varied with respect to spines, avicularia, and scutum.

The specimens from Franz-Josef Land are subject to very great variation: sometimes on the same colony the zoecia may be with or without a scutum, and this may be very minute or full-sized; the spines may be absent, or there may be one, two, or three. The median cell may be mucronate or plain, but often

the mucro only occurs on the younger zoëcia. In some positions the lateral spines are readily mistaken for a mucro.

There is one small specimen from off Cape Mary Harmsworth which has no lateral or suboral avicularia, no spines, no scutum, and the median cell is not mucronate. There are two moderate-sized specimens from off Günther Sound, on each of which I have found one lateral avicularium, while the other zoëcia are unprovided with them. These specimens have no scutum, and one lateral spine. On the other hand, there are specimens from Cape Mary Harmsworth in which both the scutum and lateral avicularia are fairly constant, and there is usually one lateral spine.

The absence of suboral avicularia seems to be general in the Arctic forms which I have had the opportunity of examining; and no authors except Busk and Smitt mention anterior avicularia on *S. gracilis*. Busk says: "anterior avicularium small, rare, and only (?) on the median zoëcium at a bifurcation." In specimens sent me from Varanger Fjord as *M. gracilis* var., there are a few anterior avicularia to the zoëcia at the bifurcation; but in these specimens there is to each zoëcium an extremely large scutum and very large elongate ovicells besides very long spines, and probably it should be separated specifically. In no other case have I seen anterior avicularia.

The radicle is attached to a raised chamber at the base of the zoëcium, and in the specimens examined there are many zoëcia to an internode.

Specimens from lat.  $77^{\circ} 55' N.$ , long.  $53^{\circ} 20' E.$ , and those from Varanger Fjord have 16 tentacles. Busk says 12 tentacles to his specimen from Franklin Pierce Bay. *S. elongata*, Sm., has 18 tentacles; *S. Smittii*, Norm., 15 tentacles.

There are two lateral rosette-plates to the entire side, and the distal wall has a number of small rosette-plates near the base. The mode of connection is similar to that obtaining in *Scrupocellaria*, and that genus must be extended to receive this portion of the *Menipea* (auct.). The only difference is that there are no vibraculæ, but this is also the case in some typical *Scrupocellaria*, and in others they are rare.

*Loc.* Spitzbergen, Greenland, Scandinavia, Kara Sea, Novaya Zemlya, Jan Mayen, Queen Charlotte Islands (*H.*), Labrador, Barents Sea, Franklin Pierce Bay; lat.  $79^{\circ} 55' N.$ , long.  $51^{\circ} 0' E.$  (*Ridley*); lat.  $79^{\circ} 31' N.$ , long.  $63^{\circ} 21' E.$ , 230 met. (*Marenzeller*).

Jackson-Harmsworth Expedition: Günther Sound, 10 fath.; nr. Wilczek Land, 127 fath.; lat. 77° 55' N., long. 53° 20' E., 130 fath.; off Cape Mary Harmsworth, 53-93 fathoms.

9. SCRUPOCELLARIA SMITTHI (*Norm.*). (Pl. 7. figs. 8-11.)

*Menipea Smittii*, Norman, Q. Journ. Micr. Sc. n. s. vol. viii. p. 214 (3).

*Menipea ternata*, forma *duplex*, Smitt, "Krit. Fört." 1867, pp. 283 & 312, pl. xvi. figs. 25, 26.

*Menipea duplex*, Levinsen, Bry. fra Kara-Havet, Dijnphna-Togtets zool.-bot. Udbytte, 1886, p. 309, pl. xxvi. figs. 1-2.

*Menipea Smittii*, Kirchenpauer, Hydr. & Bryoz. p. 418, Die zweite deutsche Nordpolfahrt.

There are specimens from 50 miles N.W. of Cape Mary Harmsworth which I think must be put to this species, although there are a variable number of spines. In the younger part of the zoarium there is usually but one spine, while in the older part there are sometimes as many as six. The central spine in the zoecium at a bifurcation may be wanting, though in other cases there are, besides the central one, two pairs of spines. There is no scutum. The lateral and suboral avicularia are both fairly constant. In some specimens there are generally six zoecia in an internode, in others ten is about the usual number.

The most important character seems to be the position of the radicle chamber, which is inside the zoecium; whereas in *S. gracilis*, and in nearly all the other species, it is formed by a conical chamber outside the zoecial wall. These chambers are formed in all the zoecia, whether there is a radicle or not. Another very important character is that the articulation occurs beyond the distal end of the outer zoecium (fig. 8). Usually in *Scrupocellaria*, as in *S. scabra*, *S. gracilis*, &c., the articulation is below the area of the outer zoecium (fig. 14).

There are 15 tentacles.

It is unfortunate that Norman did not take the varietal name *duplex*, as was subsequently done by Levinsen, but as Norman first gave a specific name it seems the correct thing to retain that name.

This species is closely related to *M. Jeffreysii*, Norm.

*Loc.* Spitzbergen, 50 fath. (*Smitt*); East Greenland (*Kirch.*); Kara Sea, 50-76 fath. (*Levinsen*).

Jackson-Harmsworth Exp.: 50 miles N.W. Cape Mary Harmsworth, 234 fath.

10. SCRUPOCELLARIA ELONGATA (*Smitt*).

*Cellularia scabra*, forma *elongata*, Smitt, "Krit. Fört." 1867, p. 284, pl. xvii. figs. 35, 36.

*Scrupocellaria scabra*, forma *elongata*, Bidentkap, Bry. von Ost-Spitzbergen, p. 614.

There are two specimens from off Cape Mary Harmsworth, in one of which there is a distinct spinous process at each upper corner, and it was at first marked "bispinata;" in the other the spines are only found on some zoœcia. There is a small sub-oral avicularium to some zoœcia and there are small lateral avicularia, no vibracula; in the specimen in which the spines are most developed there are a few scuta as figured by Smitt; the ovicell is elongate with a line down the middle and an area on each side, the radicle starts from near the base of the zoœcium, the radicle-chamber being external; zoœcium at the bifurcation acuminate. The jointing is low down as in *Scrupocellaria ternata* var. *gracilis* (Pl. 7. fig. 12), and in this respect differs entirely from *S. Smittii*, Norm. (figs. 8, 9), and is also much stouter than *S. scabra*, van Ben. There are 18 tentacles.

*Loc.* Spitzbergen (*Sm. & Biden.*); Greenland, Finland (*Sm.*).

Jackson-Harmsworth Expedition: off Cape Mary Harmsworth, 53-93 fathoms.

11. SCRUPOCELLARIA PEACHII (*Busk*).

*Cellularia Peachii*, Busk, Ann. Mag. Nat. Hist. ser. 2, vol. vii. p. 82, pl. viii. figs. 1-4.

In a paper dealing with Cellulariidæ\* I have stated my opinion that the genus *Cellularia* must be dropped, and that some species so placed belong to *Scrupocellaria*.

The differences between this and *Scrupocellaria ternata*, var. *gracilis*, Sm., seem but slight, but as yet I have not had the opportunity of making sections of this species. The radicle arises from a chamber at the base of the zoœcium.

*Loc.* British, Spitzbergen, Novaya Zemlya, Kara Sea, Murman Sea, Barents Sea, Labrador.

Jackson-Harmsworth Expedition: small specimen off Cape Mary Harmsworth, 53-93 fath.

Besides the species of Cellulariidæ already mentioned, Smitt gives *Caberea Ellisii* from Greenland, and Levinsen mentions *Kinetoskias arborescens*, Kor. & Dan., from Kara Sea [and Nordgaard gives *Bicellaria Alderi*, B., from Spitzbergen; also *Menipea Normani*, Nordg., from off the coast of Norway].

\* Journ. Linn. Soc., Zool. vol. xxvi. p. 1.



12. FLUSTRA CARBASEA, *Ell. & Sol.*

Smitt considered that this occurs both unilaminate and bilaminate, but the latter form has been named *Flustra spitzbergensis* by Bidekap\*. The specimens brought back by the Jackson-Harmsworth Expedition are all unilaminate, and have 23-24 tentacles.

*Loc.* Spitzbergen, Norway, Greenland; Jan Mayen, Jugor- and Matotschkin-Schaar; Gulf of St. Lawrence; British seas: Iceland; Rategat v. Anholl.

Jackson-Harmsworth Expedition: Günther Sound, 10 fath.; off East Glacier on floe; Cape Flora, nr. Wilczek Land, 127 fath.

13. FLUSTRA MEMBRANACEO-TRUNCATA, *Smitt.*

This throws out many radicle processes, and undoubtedly what Nitsche and Hincks called "Thurmzoëcia" are only these processes, and the appearance is often quite similar to the figures of these structures, though of course they only occur on the dorsal surface, whereas they have been figured as on the anterior surface.

There are 16 tentacles, and 3 distal rosette-plates and 6 lateral.

*Loc.* Spitzbergen, Greenland, Kara Sea, Kola, Jugor- and Matotschkin-Schaar, Norway. [Jan Mayen (*Nordgaard*).]

Jackson-Harmsworth Expedition: Cape Mary Harmsworth, 53-93 fathoms.

Besides the above two species of *Flustra*, the *F. securifrons*, Pall., has been found in the Kara Sea; the *F. serrulata*, Busk, in the Kara Sea, from West Greenland, and from Franklin Pierce Bay; *F. abyssicola* †, Sars, has been found off Novaya Zemlya.

14. MEMBRANIPORA MONOSTACHYS, *Busk.* (Pl. 8. fig. 3.)

*Membranipora monostachys*, Busk, Brit. Mus. Cat. pt. 2, p. 61, pl. lxx. figs. 1-4.

*Hippothoa rugosa*, Stimpson, Invert. of Grand Manan, 1863, Smithsonian Cont. p. 18, fig. 9.

A specimen from near Wilczek Land has the blind cells which were mistaken by Busk for avicularia, and they seem to be formed when growth is arrested by any cause, such as meeting a neighbouring branch. There are no spines, though there are indications of a central spine in some zoëcia; and it is difficult to

\* Bryozoen von Ost-Spitzbergen, p. 617, pl. xxv. figs. 1, 2.

† I regret that when describing *F. separata*, Waters, from off Nova Scotia in the Suppl. Rep. of the 'Challenger' Polyzoa, Chall. Zool. vol. xxxi., I did not recognize that it was *F. abyssicola*, Sars.

know whether it should be placed with *M. monostachys*, B., or *M. catenularia*, Jam. The lower part of the zoœcia is not contracted to the extent usual in *M. catenularia*; the margins, however, can scarcely be called thin and slope inwards. The surface of the zoœcium is nearly smooth with but slight tendency to form ridges. The opercular flap is large and very noticeable in balsam specimens, as it is less transparent than the membrane covering the rest of the opesium.

There are 10 tentacles, while there are 12 in *M. pilosa*.

*Loc.* Jackson-Harmsworth Expedition: Günther Sound, 10 fath.; off Elmwood, 18 fath.; nr. Wilczek Land, 127 fath.

#### 15. MEMBRANIPORA LINEATA (*L.*).

*Membranipora lineata*, Hincks, Brit. Mar. Polyzoa, p. 143, pl. xix. figs. 3-6; Waters, Linn. Soc. Journ. vol. xxvi. p. 678, pl. xlvii. fig. 11, pl. xlvi. fig. 9. For synonyms compare Miss Jelly's Catalogue.

Although this is widely distributed in the Arctic seas, I have only seen small pieces, which could not be used for study.

There are 13 tentacles.

*Loc.* Britain, Florida, Azores, Scandinavia, Spitzbergen, Finland, Greenland, Iceland, Davis Straits, Labrador, Kara Sea, Novaya Zemlya, Barents Sea, Jan Mayen.

Jackson-Harmsworth Expedition: off Elmwood, 18 fath.; nr. Wilczek Land, 127 fath.; off glacier between Cape Gertrude and Cape Flora, about 127 fath.; off Cape Mary Harmsworth, 53-93 fath.; lat. 77° 55' N., long. 55° 25' E., 115 fath.

#### 16. MEMBRANIPORA ARCTICA (*d'Orb.*).

*Reptoflustrina arctica*, d'Orb. Pal. Fr. vol. v. p. 582.

*Membranipora Sophiae*, Busk, Q. J. Micr. Sc. vol. iii. p. 255, pl. i. fig. 7 (1855); Ridley, Ann. Mag. Nat. Hist. ser. 5, vol. vii. p. 446, pl. xxi. fig. 2.

*Membranipora lineata*, f. *Sophiæ*, Smitt, "Krit. Fört." 1867, pp. 365 & 394, pl. xx. figs. 24, 25.

*Membranipora arctica*, Lorenz, Bry. von Jan Mayen, p. 85, pl. vii. fig. 1; Nordgaard, Bergens Museums Aarbog, 1894-5, p. 17; Bidentkap, Bry. Ost-Spitzbergen, p. 620.

In my paper on Membraniporidae in this Journal, vol. xxvi. p. 680, I suggested that it would be better to retain the name *M. Sophiae* and keep *arctica* for the *Semiflustrellaria arctica* of d'Orbigny; but as Bidentkap had, about the time my paper was written, made a species *M. spitzbergensis* for the *Semiflustrellaria arctica*, we must follow him.

There are three *Membraniporæ* which received the name

*arctica* from d'Orbigny: first the above *Reptoflustrina arctica*, then in manuscript the *Semiflustraria arctica* (= *M. spitzbergensis*, Bidekap). A specimen from Newfoundland (13705) so named in the Musée d'Hist. Naturelle, Paris, has a small, round, widely open avicularium like that in *M. flustroides*, H. There is also the *Reptoflustraria arctica*, d'Orb., which has a few stout spines, a bar to the ovicell, and a triangular avicularium above the ovicell. This may be *M. unicornis*, Flem.

In a specimen from the Gulf of St. Lawrence sent to me by Canon Norman as *M. Sophiæ*, many of the zoëcia, especially the younger, are entirely without any trace of spines, and the same condition is found in some zoëcia in the Franz-Josef Land specimen. Hincks has described from the Houston Stewart Channel (Queen Charlotte Islands) *M. Sophiæ* form *matura* \*.

*Loc.* Spitzbergen, 10–30 fath.; Greenland, Jan Mayen, Kola, Norway, Assistance Bay (*Busk*); Gulf of St. Lawrence (in my coll.); Franz-Josef Land, lat. 79° 55' N., long. 51° 0' E. (*Ridley*); Norway.

Jackson-Harmsworth Expedition: off Elmwood  $\frac{2}{3}$  mile, 18 fath.; nr. Wilczek Land, 127 fathoms.

#### 17. MEMBRANIPORA SPINIFERA, *Johnst.*

Some small specimens from Günther Sound are placed under *M. spinifera*, though in some respects they seem to be intermediate between *M. spinifera*, Johnst., and *M. cymbæformis*, Hincks. The spines, about 8–10, are more delicate than in my specimen of *M. cymbæformis* from the Gulf of St. Lawrence.

The lamina to which Mr. Hincks referred does not exist in the specimen of *cymbæformis* in my collection, from Gulf of St. Lawrence, as can be easily seen in a piece boiled in caustic potash nor is it found in the present form.

*M. spinifera*, Johnst., is mentioned from the Barents Sea by Vigelius, and from the description this agrees with the specimens from Günther Sound, 10 fathoms. *M. cymbæformis* has been recorded from Jan Mayen (*Lorenz*); Kara Sea (*Levinsen*); Davis Straits, Labrador, and Gulf of St. Lawrence (*Hincks*); Spitzbergen (*Bidekap*).

#### 18. MEMBRANIPORA MACILENTA, *Jullien.* (Pl. 8. fig. 10.)

*Membranipora macilenta*, Jullien, Bull. Soc. Géol. France, vol. vii. p. 25, pl. xvii. fig. 62, 1882.

Specimens growing on *Mytilus*-shell from nr. Wilczek Land,

\* Ann. & Mag. Nat. Hist. ser. 5, vol. x. p. 9, pl. xx. fig. 2.

127 fathoms, have large zoecia with very thin walls and an avicularium with triangular mandible at each upper corner. There is no ovicell. As far as can be seen, it agrees with Jullien's species from the North of Spain, and is much like *Membranipora membranacea* with the spinous process developed into avicularia.

There are 18 tentacles.

Besides the *Membraniporæ* referred to in this paper, *M. craticula*, Alder, is said to have been found off Jan Mayen (*Lorenz*), and Franz-Josef Land (*Ridley*), Kara Sea, Novaya Zemlya, West Greenland, and Davis Straits. *M. Flemingii*, Busk, from Jan Mayen and West Greenland. *M. armifera* from the Gulf of St. Lawrence. *M. trifolium*, S. Wood, from Jan Mayen. [*M. cornigera*, Busk, from Bear Island (*Nordgaard*).]

19. CRIBRILINA PUNCTATA (*Hassall*). (Pl. 8. fig. 22.)

*Escharipora punctata*, Smitt, "Krit. Fört." 1867, p. 4, pl. xxiv. figs. 4-7.

The species brought back by the Jackson-Harmsworth Expedition is no doubt the species figured by Smitt, but it seems exceedingly doubtful if this is the same as the British species, and therefore I only refer to Smitt; and not having had the opportunity of examining many specimens of *C. punctata* I hesitate to give a new specific or varietal name, especially as the Franz-Josef Land specimens are very fragmentary and not sufficient for thorough examination.

The difference consists in the very wide ovicell, which is often almost concealed; and although Hincks speaks of the ovicell being subject to considerable variation, the difference between this very wide ovicell and the rather narrow ovicell of the ordinary British form is so very great, that until the links have been carefully studied we may doubt the identity.

It is mentioned as occurring off Jan Mayen, but as *Lorenz* does not give any particulars we cannot judge which form he had before him.

This species is of considerable interest from the fact that it occurs of the same size and with the same characters on a specimen of *Hornera lichenoides*, Pont., said to be from lat. 74° S. and long. 172° E., 330 fath., and to have been dredged by Sir John Ross in his Antarctic expedition. Mr. Busk mentions and had named the *Hornera* and also a piece of *Escharoides Sarsii*, Smitt, from the same dredge; but the *Cribrilina punctata*, Hass., had not been determined or mentioned when Mr. Kirkpatrick kindly

allowed me to examine the specimens in the British Museum collections.

Mr. Busk, however, in the Journal of this Society (vol. xv. p. 237), when describing Arctic *Escharoides Sarsii*, Sm., says it was collected in the Antarctic by the 'Erebus' and 'Terror,' "and was accompanied in the same collection by two other Arctic species." That a single haul so far south—in fact the farthest south from which any Bryozoa have been found—should furnish three of the commonest Arctic species, two of which have probably not been found outside the Arctic regions, seems so strange that we must pause and consider if there is no possibility of a mistake. This would be stronger proof of bipolarity of species than has yet been brought forward, and as much as the most ardent believers in the theory could expect.

Unless the present Antarctic expeditions should bring back some of these species, we shall be justified in thinking that there has been some change of label or exchange of box. As Sir John Ross had been in the Arctic regions, there is the possibility of this exchange having occurred on board the ship, or it may have happened subsequently in Mr. Busk's hands.

There are several specimens of mites in the *Escharoides*, and although the probability was so great that their origin was London, I asked my friend Mr. A. D. Michael if they could throw any light upon whether the Bryozoa came from the Arctic or Antarctic. He informed me that the specimens were immature *Glyciphagus domesticus*, de Geer, which is cosmopolitan, and therefore it does not help to settle the point. Mr. Michael informs me that this species had been found by the Jackson-Harmsworth expedition on the rocks some distance from the station, and that a drawing had been made of it at the time. Often specimens of Bryozoa are so full of diatoms that a question of doubtful origin could be settled by an examination of sections, but unfortunately there do not seem to be either foraminifera or diatoms to give us the geographical origin.

The occurrence of this *Cribrilina* identical with the Arctic form is of more importance than that of either *H. lichenoides* or *E. Sarsii*, being more highly differentiated, or at least having more distinctive characters.

· *Loc.* Bohus Bay (*Smitt*) ; littoral, Norway (*Smitt*) ; Gullmaren, 7–10 fathoms.

Jackson-Harmsworth Exp.: Lat. 77° 55' N., long. 53° 16' E., 130 fathoms.

20. CRIBRILINA ANNULATA (*Fab.*). (Pl. 8. fig. 21.)

Round the distal border there are, in the specimen from Franz-Josef Land, calcareous processes in place of the spines.

*Loc.* Spitzbergen, Jan Mayen, Kara Sea (*Levinsen*), Finland, New Brunswick, Gulf of St. Lawrence, Labrador, Scandinavia, British Isles, Denmark.

Jackson-Harmsworth Exp.: off glacier between Cape Flora and Cape Gertrude, about 30 fathoms.

I have already shown the geographical distribution of *Flustra*\* and *Membranipora*†, and we now seem to be sufficiently well acquainted with *Cribrilina* to give a similar list for this genus.

Arctic .....	C. ANNULATA ‡, <i>Fab.</i> , PUNCTATA, Gray, <i>nitidopunctata</i> , Sm., <i>scutulata</i> , Busk (? <i>Cribrilina</i> ).
British .....	ANNULATA, PUNCTATA, RADIATA, Aud., FIGULARIS, Johnst., GATTYÆ, Busk.
Mediterranean .	RADIATA, FIGULARIS, GATTYÆ, BALZACI, Aud., SETOSA, Waters.
North Atlantic.	PUNCTATA, RADIATA, BALZACI, SETOSA.
South Atlantic.	RADIATA, MONOCEROS, Busk, <i>latimarginata</i> , Busk.
South African..	<i>labiosa</i> , Busk.
Australasian ...	RADIATA, MONOCEROS, PHILOMELA, B., <i>acanthoceros</i> , MacG., <i>setirostris</i> , MacG., <i>speciosa</i> , Hincks, <i>tubulifera</i> , H., <i>clithridata</i> , Waters.
South Indian Ocean.	RADIATA, <i>philomela</i> var. <i>adnata</i> , Busk.
North Pacific ...	MONOCEROS, <i>hippocrepis</i> , Hincks, <i>furcata</i> , H.
South Pacific ...	MONOCEROS.
Japan .....	PHILOMELA, Busk, <i>reniformis</i> , Ortmann.

21. SCHIZOPORELLA CRUSTACEA (*Smitt*). (Pl. 8. figs. 11-13.)

*Myriozoum crustaceum*, Smitt, "Krit. Fört." 1867, p. 18, pl. xxv. figs. 88-91; Ridley, Ann. Mag. Nat. Hist. ser. 5, vol. vii. p. 448; Bidentkap, Bry. Ost-Spitzbergen, Zool. Jahrb. vol. x. p. 622.

*Leieschara crustacea*, Levinsen, "Bry. f. Kara-Havet," *Dijmphna* Tøgtets zool.-bot. Udbytte, 1886, p. 317 (13).

*Schizoporella crustacea*, Lorenz, Bry. von Jan Mayen, p. 87, pl. vii. fig. 2.

\* Journ. Roy. Micr. Soc. 1896, p. 286.

† Journ. Linn. Soc., Zool. vol. xxvi. p. 664.

‡ Species printed in small capitals occur from a second region.

*Lepralia plana*, Dawson, Polyzoa of the Gulf of St. Lawrence, Rep. Canadian Geol. Surv. 1858, p. 256.

*Myriozoum planum*, Hincks, Ann. Mag. Nat. Hist. ser. 6, vol. ix. p. 157.

*Myriozoum* is the genus of Donati of which the type is *M. truncatum*, and it, together with *M. coarctum* and *subgracile* and the genus *Haswellia*, has very long pore-tubes, and the centre of the zoarium of the erect species has a spongy structure. *Schizoporella crustacea* has longer pores than most of the Bryozoa, and they open diagonally, causing the open ornamentation; but the value of a character like this is difficult to estimate, as it is only one of degree, short pores occurring in a great part of the Chilostomata. The shape of the aperture corresponds with that of *Myriozoum coarctum* and *M. subgracile*.

I do not consider this species the same as *S. incisa*, M.-Ed.; and therefore probably the fossil determined by Neviani as *S. crustacea* should be placed elsewhere. The description of *L. plana*, Dawson, was too insufficient to justify the adoption of that name.

There are 15 tentacles.

*Loc.* Greenland, 14–35 fath. (*Busk*); Spitzbergen, 10–80 fath. (*Bidenkap*); Kara Sea, 30–85 fath.; Kola; Jan Mayen, 15–180 metres (*Lorenz*); Gulf of St. Lawrence; lat. 79° 55' N., long. 51° 0' E. (*Ridley*); Finland.

Jackson-Harmsworth Exp.: off Elmwood, 18 fath.; Günther Sound, 10 fath.

22. SCHIZOPORELLA HARMSWORTHII, nom. nov. (Pl. 9. figs. 10–12.)

*Eschara Legentilii*, Aud., forma *prototypa*, Smitt, "Krit. Fört." 1867, pp. 10 & 81, pl. xxiv. figs. 47, 48.

*Schizoporella cincta*, Hincks, var., Hincks, Ann. Mag. Nat. Hist. ser. 6, vol. ix. p. 154, pl. viii. fig. 2.

The imperforate area immediately below the oral aperture is often depressed, giving a characteristic appearance to the zoecium; in other cases it is raised and carries an avicularium. The pits on the surface are very deep and are perforated at the bottom.

The suboral glands of this species are very interesting, as they arise from the upper part of the tentacular sheath, and the gland is attached to the sheath for some little distance. The glandular cells are distinctly nucleated, and the interior of the gland contains a nearly homogeneous mass which does not stain. From

this I think we may conclude that the suboral and avicularian glands are homologous. In this species, as well as in those alluded to in the subsequent part of this paper, it appears that the gland is emptied close by the wall of the tentacular sheath when the polypide is extruded; and we have seen that the avicularian gland of *Lepralia foliacea*\*, Ell. & Sol., is attached in a somewhat similar manner to the sheath of the avicularium. The contents of the avicularian glands of *Porella acutirostris*, Smitt, are also a homogeneous mass; and we can scarcely doubt any longer that these glands are excretory organs.

Kirchenpauer has given the name *Lepralia Smittii* to *Escharella Legentilii*, forma *prototypa* of Smitt, but as Smitt figures distinct forms under his *prototypa* the name cannot be retained. Possibly Smitt had *Lepralia borealis*, Waters, before him as well as the present form.

*Loc.* St. Lawrence (*H.*); Spitzbergen (*Sm.*); Greenland (*Sm.*).

Jackson-Harmsworth Exp.: Lat. 77° 55' N., long. 53° 16' E., 130 fath.; off glacier between Cape Flora and Cape Gertrude, about 30 fath.

23. SCHIZOPORELLA ELMWOODIÆ, sp. nov. (Pl. 9. figs. 1 & 13.)

A dry specimen encrusting a piece of basalt from off Elmwood, 18 fathoms, seems to be new.

The zoecia are broadly ovate, considerably raised, and distinctly separated, with the surface finely granular, and with pores scattered over the surface. The aperture is close to the distal edge, and has a distinct sinus. The operculum is granular, and instead of having two muscular dots, as in most *Schizoporellæ*, has a muscular ridge some distance from the border, and must perhaps ultimately be put in a separate division of the *Schizoporellæ* on that account. The ovicell is much raised, very broad and granular; and is not closed by the operculum. In a few zoecia there is a triangular avicularium on one side lower than the aperture. There are sometimes irregular elevations on the two sides of the zoecia.

Besides the *Schizoporellæ* brought back by this Expedition, *S. candida*, Stimpson; *S. linearis*, Hass.; *S. biapertura*, Mich.; *S. sinuosa*, B.; *S. limbata*, Lorenz; *S. styliifera*, Levinsen; *S. auriculata*, Hass., are said to have been found in the Arctic regions.

\* Waters, "Observations on Gland-like Bodies in the Bryozoa," Linn. Soc. Journ., Zool. vol. xxiv. p. 272.



## MYRIOZOOM.

Whether this genus should be retained is very questionable, but for the present it is more convenient to keep the name for *M. coarctum*, Sars, and *M. subgracile*, d'Orb., remembering that in descriptive papers we may often have to use generic divisions which we are aware may ultimately be altered.

The genus was created by Donati with *M. truncatum*, Pall., as the type, and it has been based to a large extent upon the zoarial shape of growth; and the definitions given by Donati, Sars (*Leieschara*), d'Orbigny, and Smitt would not justify its retention. The aperture of *M. truncatum* is nearly round, while those of *M. coarctum* and *subgracile* are schizoporellidan, with a well-marked sinus.

There is, however, one character which may be of great classificatory value, and that is the long tubes, which I have called pore-tubes, from the surface to the interior, and from one zoecium to another, causing the spongy structure of the zoarium. These tubes have a disk near the junction with the zoecium; and in the middle of the axial tubes, which are often very long, there are similar disks (Pl. 9. fig. 6 *d*; fig. 7 *d*). The shell-structure is terminated by a membrane (fig. 8 *b*) perforated by these pores; but over this, as in the greater part of the Chilostomatous Bryozoa, there is another fairly thick and somewhat chitinous membrane (fig. 7 *a*) continuously covering the zoarium. The cell-contents of the tubes attach themselves to this by delicate threads (fig. 8); and thus by this connection there may be an interchange between the sea-water and the contents of the tubes, which again are in indirect communication with the contents of the zoecia. Although in other genera these tubes are not developed to the same length, the structure is very similar.

In figures 6, 7 (Pl. 9), drawn to explain these tubes, the way in which the diaphragm is folded when the polypide is retracted is also shown. This folding, which at first I called an opercular fold, occurs in a similar position in most of the Chilostomata, but the appearance of this diaphragm varies much in different species<sup>2</sup> and at different times. It is attached to the tentacular sheath, and is, as described by Nitsche\*, a strong sphincter which can completely close the tentacular sheath-cavity. The central

\* Nitsche, "Ueb. Anat. u. Entw. von *Flustra membranacea*," Zeits. f. wiss. Zool. vol. xxi. p. 17.

opening seems to be a chitinous ring in *Lepralia sincera*, Sm., from which there are rays of muscular tissue, and there are concentric rings, also no doubt contractile.

Pergens\* speaks of the tentacular sheath having four closeable openings: (1) the opercular opening, (2) Nitsche's diaphragm, (3) oral opening, (4) anal opening; but this seems to me more complicated than is the case, and though the diaphragm may in some cases be a little distance from the external opening, yet it seems enough to speak of the opening through the diaphragm and the anal opening; and I cannot follow Pergens in considering that any opening has been found from the tentacle-sheath into the body-cavity.

*Myrionozoum ovum*, Smitt, will be *Stichoporida* or *Fedora*; and *M. marionensis*, Busk, is the only species determined as *Myrionozoum* from the Southern hemisphere.

#### 24. MYRIOZOUM COARCTUM (*Sars*). (Pl. 9. figs. 2, 3.)

*Cellepora coarcta*, M. Sars, *Nyt Mag. f. Naturv.* vol. vi. p. 148 (28), 1850?

*Leieschara coarcta*, M. Sars, *Beskr. N. Poly.* 1862, p. 155 (17).

For synonyms of Smitt, Busk, Hincks, Lorenz, see Miss Jelly's Catalogue.

*Myrionozoum coarctum*, Bidentkap, *Bryozoen von Ost-Spitzbergen*, *Zool. Jahrb.* vol. x. p. 621; Hennig, *Œfvers. af K. Vetensk.-Ak. Förh.* 1896, p. 357.

This species does not appear to have been figured, saving the section given by Smitt. The semicircular avicularia are placed in a row between the zoecia and vary considerably in size, so that the avicularian aperture may be as large as the oral aperture. There are 16 tentacles, as in *M. subgracile*, d'Orb., while in *M. truncatum*, Pall., there are about 26 or 27 tentacles. Pergens speaks of 33, but I have not seen so many, and sections he sent me correspond with those I made from material brought back from Naples. One of the pieces is about two inches long, and has clearly been broken off a much larger one. The branches anastomose at an angle of about 60 degrees and more, and some branches grow out nearly at right angles from the main branches.

*Loc.* Spitzbergen, 19–80 fath. (*Smitt*), 40–95 fath. (*Bidentkap*); Kola, Norway; Jan Mayen, 140–400 metres (*Lorenz*); Davis

\* "Untersuch. an Seebryozoen," *Zool. Anzeiger*, 1889, p. 4.

Straits, 100 fath. (*Hincks*); Murchison Sound, 45 fath. (*Hennig*); Finland? (*Sars*).

Jackson-Harmsworth Expedition: about 40 and 50 miles off Cape Mary Harmsworth, 234 fathoms.

25. *MYRIOZOOM SUBGRACILE*, *d'Orb.* (Pl. 9. figs. 4-8.)

*Myriozoom subgracile*, *d'Orb.* Pal. Franç. vol. v. p. 622; Smitt, "Krit. Fört." 1867, pp. 18 & 119; *Hincks*, Ann. Mag. Nat. Hist. ser. 4, vol. xix. p. 106; *D'Urban*, Ann. Mag. Nat. Hist. ser. 5, vol. vi. p. 274; *Ridley*, Ann. Mag. Nat. Hist. ser. 5, vol. vii. p. 448; *Waters*, Journ. Roy. Micr. Soc. vol. ii. p. 390, pl. xv. fig. 5; *Bidenkap*, Bry. von Ost-Spitzbergen, Zool. Jahrb. vol. x. p. 622.

*Myriozoom pulchrum*, *Ortmann*, Die Japanische Bryozoen-fauna, Arch. f. Naturgesch. 1889, p. 53, pl. iv. fig. 8.

In the Franz-Josef Land specimens the subcircular avicularium is usually slightly above the oral aperture to one side, and placed diagonally. In the Japanese specimen in my collection the avicularium, though slightly lower, is similarly placed, but it is only found to a few zoecia.

There are 16 tentacles, as in *M. coarctum*, *Sars*; and the two species are very similar, though it seems that they should be separated on account of the difference in size and position of the avicularium. We cannot be absolutely sure which of the two species *Sars* and other writers previous to *Smitt* had before them.

Some of *d'Orbigny's* specimens from Newfoundland in the Musée d'Hist. Nat. belong to this species, but I had not time, when in Paris, to examine whether any of the specimens might be *M. coarctum*.

*Loc.* Spitzbergen, 19-80 fath. (*Smitt*), 55-65 fath. (*Bidenkap*); Kara Sea, Greenland, Barents Sea, Murman Sea (*D'Urban*); Davis Straits, 100 fath. (*Hincks*); Franklin Pierce Bay (*Busk*); Newfoundland (*d'Orb.*); lat. 75° 36' N., long. 57° 6' E. (*Marenzeller*); Japan.

Jackson-Harmsworth Exp.: off Elmwood, S.W. 1½ mile, 26 fath.; off glacier between Cape Flora and Cape Gertrude, about 30 fath.; Cape Gertrude, 30 fath.; nr. Wilczek Land, 127 fath.; off Cape Mary Harmsworth, 53-93 fath.

26. *HIPPOTHOA EXPANSA*, *Dawson.* (Pl. 8. fig. 19.)

*Hippothoa expansa*, *Hincks*, Brit. Mar. Polyzoa, p. 291, pl. i. fig. 1, which see for synonyms.

The ovicelliferous zoecia are usually shorter than the others,

and the aperture has the lower edge nearly straight, so that the operculum is similar to that of the ovicelligerous zoëcia of *Hippothoa hyalina*, L. All the specimens from Elmwood were dry, and there was no material for cutting sections. The *H. divaricata* has the aperture of the ovicelligerous and ordinary zoëcia similar, both having a broad sinus.

*Loc.* Gulf of St. Lawrence, Labrador, Maine, Queen Charlotte Islands; Greenland, 57 fath.; Shetland, 100 fath.

Jackson-Harmsworth Exp.: off Elmwood, 18 fath.

27. *HIPPOTHOA HYALINA*, L. (Pl. 8. figs. 16-18.)

*Mollia hyalina*, forma *hyalina*, Smitt, "Krit. Fört." 1867, p. 16, pl. xxv. figs. 84, 85. Compare list of synonyms in Hincks's Brit. Mar. Poly. p. 271, and Miss Jelly's Catalogue.

Norman\* considers this should be placed in the genus *Celleporella* of Gray, and states that it was the only species in the genus as described by Gray, and that therefore the genus *Diazeuxia* of Jullien is merely a synonym. It would be unfortunate if the laws of priority obliged us to put the latter under *Celleporella*, as it has been used in another sense by both Hincks and Norman.

However, the reasons for separating *Diazeuxia* from *Schizoporella* are based upon the reproductive characters mentioned by Jullien. The female zoëcia carrying the ovicell are usually very short, and according to Jullien possess no polypide. I have, however, some specimens in which these zoëcia are about the same size as the others. There are also very minute zoëcial cells with very small opercula (fig. 16), which Jullien says are male zoëcia without polypides; and these may occur on the front of an ordinary zoëcium, as in specimens from California, or there may be one at each side of the aperture, or they may occur scattered between other zoëcia.

*Hippothoa* has usually short ovicelligerous zoëcia; and if we are to attach most weight to the reproductive organs, then there seems little doubt that the right place for this species is *Hippothoa*. The shape of the aperture of the ordinary zoëcia is similar throughout the genus. Jullien considers that larval peculiarities and other characters justify this being placed in a family *Diazeuxiæ*, and probably family distinction may have to be made. The small specimens available have not been sufficient for cutting satisfactory sections.

\* Ann. & Mag. Nat. Hist. ser. 6, vol. xiii, p. 129.

Barrois shows that the larva, although of the "*Escharina*-" type, differs from others, and is in fact simpler, resembling rather closely that of his *Mollia granifera* (*Microporella impressa*, Aud.). It has four pairs of oculiform points, and apparently from his figures two single ones; that is to say, these pigment-cells are more numerous than is usually the case. There is no ciliated crown.

In the Franz-Josef Land specimens there are 14 tentacles: but Jullien and Hincks mention 12 tentacles.

*Loc.* Cosmopolitan. In the Arctic regions—Spitzbergen, Greenland, Jan Mayen, Kara Sea, Barents Sea, Scandinavia. It also occurs in South America, Australia, and the Kerguelen region.

Jackson-Harmsworth Exp.: Günther Sound, 10 fath.; off Cape Mary Harmsworth, 53-93 fath., 7/8/97, with ova and ovicells.

28. PSEUDOFLUSTRA PALMATA (*Sars*). (Pl. 8. figs. 7-9.)

*Eschara palmata*, Sars, Forh. i Vidensk. Selsk. 1863, p. 146 (8).

*Escharella palmata*, Smitt, "Krit. Fört." 1867, pp. 10 & 77, pl. xxiv. figs. 42-46; Whiteaves, Rep. on Gulf of St. Lawrence, 1874, p. 12; Levinsen, Bry. fra Kara-Havet, Dijnphna-Togtets zool.-bot. Udb. p. 318 (14), pl. xxvii. fig. 3; Lorenz, Bry. von Jan Mayen, p. 91; Marenzeller, Denks. K. Akad. Wissensch. Wien. vol. xxxv. p. 388.

*Flustra solida*, Stimpson, Mar. Inv. Grand Manan, 1853, Smithsonian Cont. p. 19, fig. 12; Hincks, Ann. & Mag. Nat. Hist. ser. vol. vi. p. 282, pl. xv. figs. 2, 3, and ser. 6, vol. ix. p. 149, pl. viii. fig. 1.

*Eschara solida* Vergelius, Niederl. Arch. f. Zool., Suppl. B. p. 15, figs. 2, 3.

*Pseudoflustra solida*, Bidentkap, Bry. von Ost-Spitzbergen, Zool. Jahrb. vol. x. p. 618.

It is difficult to know where this should be placed. *Eschara* has been discarded, *Escharella* of Smitt is not the same as *Escharella* of d'Orbigny, and Smitt's *Escharella* corresponds now for the greater part with *Smittia* (Hincks). The name *Pseudoflustra* is unfortunate, the foliaceous growth having suggested *Flustra*; but the entirely different aperture, the characters of avicularium and ovicell, besides the rosette-plates near the basal wall, all suggest the removal from *Flustra*, and the relationship is in the direction of *Lepralia*. The genus *Cyclicopora*, Hincks, has a nearly round aperture, though the operculum has the lower edge more or less straight, in some respects resembling the operculum

of *Membranipora*; but the genus is described as without avicularia, though we have often seen that it is dangerous to make the absence of avicularia a generic character: in fact negative characters are not often to be relied upon. At present there does not seem sufficient reason for placing the *palmata* of Sars under *Cyclicopora*, and therefore the name given by Bidekap is retained. Stimpson may have had this species before him; but as the description appears quite insufficient for recognition, and might almost as well be applied to some other species, it seems only right to retain the name given by Sars, as he clearly described it.

The form which Hincks described (*loc. cit.* pl. viii. fig. 1) with a distinct sinus in the aperture, and with semicircular avicularia, can hardly remain with this species.

There are two large rosette-plates near the basal wall and several (6-8) on the lateral wall. I have not found any oral or avicularian glands. There are 18 tentacles. A specimen from lat. 77° 55' N., long. 53° 20' E., has the peristome raised at the side, but this does not occur in any of the other specimens.

The zoaria, according to Vigelius, may be uni- or bilaminate, but I have only seen them bilaminate.

*Loc.* Spitzbergen (*Smitt & Bide.*), Greenland, Kola (*Sm.*), Barents Sea (*Hincks*), Matotschkin Schaar (*Sm. & Stuxb.*), Kara Sea, Jan Mayen (*Lorenz*); lat. 79° 13' N., long. 63° 21' E., 230 met. (*Marenzeller*); Norway (*Nordgaard*); St. Lawrence (*Hincks*); New Brunswick (*Stimpson*).

Jackson-Harmsworth Exp.: off glacier between Cape Flora and Cape Gertrude, 30 fath.; off Cape Gertrude, 30 fath.; lat. 77° 55' N., long. 53° 20' E., and long. 53° 16' E., 130 fath.

## 29. LEPRALIA SINCERA (*Smitt*). (Pl. 8. fig. 2.)

*Discopora sincera*, Smitt, "Krit. Fört." 1867, p. 28, pl. xxvii. figs. 178-180.

*Lepralia sincera*, Hincks, Ann. Mag. Nat. Hist. ser. 4, vol. xix. p. 102, pl. xi. fig. 2; Lorenz, Bry. von Jan Mayen, p. 88; Hennig, Öfvers. Vetensk.-Ak. Förh. 1896, p. 357.

*Discopora reticularis*, Van Beneden, Recherches sur les Bry. de la Mer du Nord, Bull. Acad. Roy. Belg. vol. xvi. p. 652, pl. ii. figs. 15-18.

*Hemeschara sincera*, Busk, Journ. Linn. Soc., Zool. vol. xv. p. 237.

*Mucronella sincera*, Nordgaard, Bergens Mus. Aarbog, 1894-5, p. 29, pl. i. fig. 6; Bidekap, Bry. von Ost-Spitzbergen, Zool. Jahrb. vol. x. p. 625.

There are 22 tentacles and two distal rosette-plates. I am unable to find any oral glands, and do not see any ovaria or testes in the sections prepared.

The aperture and operculum vary somewhat from typical *Lepralia*; but there does not seem sufficient reason for removing it from *Lepralia* at present.

*Loc.* Spitzbergen, 19–60 fathoms (*Smitt*); Greenland (*Hennig*); Kara Sea; Jan Mayen, 160–270 metres (*Lorenz*); Finland, Davis Straits (*Hincks*); Baffin's Bay, 175 fath., Franklin-Pierce Bay, Smith's Sound, 13 fath. (*Busk*); Inglefield Gulf, 25 fath., and Northumberland Island, 20 fath. (N.W. Greenland) (*Hennig*).

Jackson-Harmsworth Exp.: off Cape Mary Harmsworth, 53–93 fathoms.

### 30. LEPRALIA BOREALIS, sp. nov. (Pl. 8. figs. 4–6.)

Zoecia encrusting, rhombic, very distinctly separated by divisional lines, row of pores round the border, surface granular; median suboral avicularium with small round mandible, large raised ovicell with numerous pores; fairly thick operculum nearly straight on the lower edge; oral aperture subcircular, with a small lateral denticle on each side, four lateral rosette-plates near the basal wall. There are 18 tentacles and two oral glands, but there do not appear to be any avicularian glands.

This in many respects resembles some of Smitt's figures of *Escharella Legentilii* var. *prototypa*, but no doubt Smitt placed several distinct species under *Legentilii*. This differs from *Smittia reticulata*, MacG., in the shape of the operculum, and in having no central denticle (lyrula). The mandible has a large median lucida, and two large clear spots, and is somewhat of the *Porella*-type. The avicularian chamber extends to each border.

*Loc.* Lat. 77° 55' N., long. 53° 16' E., 130 fathoms.

### 31. LEPRALIA CRUENTA, *Norm.*

*Lepralia cruenta*, Norman, Ann. Mag. Nat. Hist. ser. 3, vol. xiii. 1864, p. 7 (88).

*Discopora cruenta*, Smitt, Öfvers. Vetensk.-Ak. Förh. 1871, p. 1127, pl. xxi., and 1878, p. 23.

*Schizoporella cruenta*, Hincks, Brit. Mar. Polyzoa, p. 270, pl. xxx. fig. 5; id. Ann. Mag. Nat. Hist. ser. 5, vol. vii. p. 449, pl. xxi. fig. 4; id. ibid. ser. 5, vol. xiii. p. 211; id. ibid. ser. 6, vol. ix. p. 153, pl. viii. fig. 5; Ridley, Ann. Mag. Nat. Hist. ser. 5, vol. vii. p. 449, pl. xxi. fig. 4.

*Mucronella cruenta*, Nordgaard, Bergens Mus. Aarbog, 1894-5, p. 30.

*Porina ciliata*, forma *dura*, Smitt, "Krit. Fört." 1867, pp. 6 & 58, pl. xxiv. fig. 17.

*Mucronella spinulifera*, Hincks, Ann. Mag. Nat. Hist. ser. 6, vol. iii. p. 431, pl. xxi. fig. 3.

*Monoporella spinulifera*, Hincks, Ann. Mag. Nat. Hist. ser. 6, vol. ix. p. 152.

The dry specimens on *Balanus*, from off Elmwood, are reddish black with fairly large zoëcia irregularly undulated, and more nearly resemble Smitt's than any of the other figures; and Hincks may be right in considering that the *M. spinulifera* is the species described by Smitt, and that it is not the same as the *Lepralia cruenta* of Norman. The peristomial opening in the older zoëcia is subtriangular, having a kind of sinus, and resembles in appearance that of *Escharoides Sarsii*, Sm., and may easily have been taken for adnate *E. Sarsii*. The younger zoëcia show the straight proximal edge to the aperture. The oral aperture in older zoëcia is very much depressed, and is not visible from the front; and when Hincks and Ridley speak of a sinus they could only have seen the peristomial opening. The operculum has a straight lower edge, and is fairly characteristic Lepralian (woodcut, p. 78, fig. 1). There is a row of pores round the border. The ovicell has been figured by Smitt in a paper apparently overlooked by Hincks when writing his 'Brit. Marine Polyzoa,' but to which he has subsequently referred. In the Elmwood specimens the ovicells show the front zoëcial wall extending over the lower corners of the ovicell, which is but little raised.

Hincks placed this species under *Mucronella*, on account of the small projection below the aperture, which is not constant, and is sometimes entirely wanting. In a subsequent paper he said perhaps it ought to go to *Monoporella*, and when *Lepralia* and its allies have been thoroughly worked up a group may be separated off as *Monoporella*, though it is doubtful whether there will be any reason for removing *cruenta* from *Lepralia* as we now understand it. This is, however, one of the numerous instances which shows that *Mucronella* ought to be dropped.

*Loc.* Greenland, Spitzbergen, East and West (*Sm.*); Finland, Matotschkin Schaar; St. Lawrence (*Hincks*); Franz-Josef Land, lat. 79° 55' N., long. 51° 0' E. (*Ridley*); Hammerfest (*Nordgaard*). British seas.

Jackson-Harmsworth Exp. off Elmwood, 18 fathoms.



32. *LEPRALIA HIPPOPUS*, *Smitt.* (Pl. 8. fig. 20.)

*Lepralia hippopus*, Smitt, "Krit. Fört." 1867, pp. 20 & 127, pl. xxvi. figs. 99-105; Hincks, Brit. Mar. Polyzoa, p. 309, pl. xxxiii. figs. 8, 9.

This is common on pieces of basalt from off Elmwood, at a depth of 18 fathoms. There are but very few avicularia, and it is often only after careful search that two or three are found on a large colony. The specimens entirely correspond with the description given by Hincks of the specimen from off Northumberland. The operculum does not close the ovicell. There is a *Lepralia* allied to this in the Southern hemisphere which has been named by MacGillivray *Schizoporella pulcherrima*. *L. pulcherrima* has a row of large pores round the border, and a semicircular avicularium at each side of the aperture, and the operculum, which is truly Lepralioid, is shorter than that of *L. hippopus*. The latter species is very similar to the *Lepralia incisa*, Busk, from Inaccessible Island (*Challenger*).

*Loc.* Spitzbergen, Greenland, and Finland (*Sm.*); Gulf of St. Lawrence (*Dawson*, and in my coll.). Coast of Northumberland.

Jackson-Harmsworth Exp.: off Elmwood, 18 fathoms.

33. *LEPRALIA PORIFERA* (*Smitt.*) (Pl. 8. figs. 14, 15.)

*Escharella porifera*, forma *typica*, Smitt, Cefvers. Vetensk.-Ak. Förh. 1867, p. 9, pl. xxiv. figs. 30-32.

*Lepralia porifera*, Hincks, Ann. Mag. Nat. Hist. ser. 4, vol. xix. p. 102, pl. x. figs. 1, 2 (1877).

? *Smittia Landsborovii*, var. *porifera*, Hincks, Brit. Mar. Polyzoa. p. 343, pl. xxxvi. fig. 1 (*non* Ann. Mag. Nat. Hist. ser. 6, vol. i. p. 225. pl. xiv. fig. 2).

*Smittia porifera*, Lorenz, Bry. Jan Mayen, p. 92; Nordgaard, Syst. fort. over de i Norge, hidt. observ. Art. af Mar. Polyz., Bergens Mus. Aarbog, 1894-5, No. ii. p. 26, pl. ii. fig. 1.

The central denticle is wanting, as has been already mentioned by Hincks and others, and in this respect it differs from *Smittia*; also the operculum is fairly thick, and of the *Lepralia*-type, on which account it is placed under *Lepralia*.

*Loc.* Spitzbergen and Greenland (*Sm.*); Norway (*Nordg.*); Davis Straits (*Hincks*), given as Iceland in mistake; Jan Mayen (*Lorenz*). S. Devonshire?

Jackson-Harmsworth Exp.: Lat. 77° 55' N., long. 53° 16' E., 130 fath.

Besides the species already mentioned, *Lepralia megastoma*, B., and *L. vitrea*, Lorenz, are mentioned as Arctic species.

## PORELLA.

The genus *Porella* is very well represented in the Arctic, and therefore some comparisons have been made with *Porella* from various localities, and the opercula and mandibles of some species not occurring in the present collection, as *P. cervicornis*, M.-Edw., *P. lævis*, Flem., *P. rostrata*, Hincks, *P. lorea*, Alder, have been figured. As the result of these examinations, two groups have been made, though it is felt probable that the second may be ultimately separated from *Porella*.

The typical *Porella* may be adnate or erect, and has below or within the aperture an avicularium with a semicircular mandible, and this mandible has well-marked thickenings forming diagonal bars as mentioned by Busk\*.

The operculum is nearly straight on the proximal edge, with the corners cut off, and a muscular ridge on each side a little distance from the border. The ovicells are always or usually imperforate. In the group there is not usually any lyrula (denticle), though in *P. concinna*, Busk, and *P. minuta*, Norm., it can be found. Perhaps with more material the synonyms will be more reduced than I have been able to do in this paper.

The second group has a very wide avicularian chamber, in which there is a pair of large glands. Where there has been suitable material these glands have been found. The operculum has muscular ridges farther from the edge than in the first group, and the mandibles have no marked cross-bars, but a lucida in the middle. The mandibles are usually semicircular, but in *P. acutirostris* they are triangular.

In this group are *P. saccata*, Busk, *P. perpusilla* †, Busk (*elegantula*, d'Orb.); *inflata*, sp. nov.; *P. acutirostris*, Smitt, and apparently *Porella marsupium*, MacG.; perhaps *Lepralia foliacea*, E. & S., and *P. margaritifera*, Quoy & Gaim.

In *P. rostrata*, Hincks, and *P. malleolus*, Hincks, the mandible spreads out at the distal end, and this seems to be the case in some other Australian species, and occurs also in *P. nitidissima*, H.; but as *P. rostrata* has a distinct denticle, perhaps it should be put under *Smittia*. We may here remark that although the well-marked diagonal bars to the mandible are a noticeable character, yet the structure is not confined to *Porella*,

\* Zool. Chall. Exp. pt. xxx. p. 147.

† *P. perpusilla*, Busk, from Newfoundland, has a denticle.

and in some allies the bars are represented by lines, as in one or two species of *Smittia* and *Cellepora*; and in the mandible of *Schizoporella auriculata*, Hass., the markings seem to indicate the same structure.

Besides the species referred to, *P. struma*, Norman, is mentioned from Barents Sea and Finland; and *P. patens*, Smitt, from Spitzbergen.

34. PORELLA CONCINNA, *Busk*. (Pl. 11. figs. 9, 10.)

From lat. 77° 55' N., long. 53° 16' E., there is a small specimen of the typical *concinna* with pores round the edge, and the peristome raised slightly at each side of the aperture. This also occurs off Elmwood, and there is one specimen of the variety fig. 13 of Hincks, Brit. Mar. Polyzoa, also from off Elmwood.

*Loc.* Greenland, Spitzbergen, Finland, Jan Mayen; lat. 79° 55' N., long. 51° 0' E. (*Ridley*); Gulf of St. Lawrence, British Columbia (*H.*); Japan (*Ortmann*). British seas.

Jackson-Harmsworth Exp.: off Elmwood, 18 fathoms; lat. 77° 55' N., long. 53° 16' E., 130 fath.; off Cape Mary Harmsworth, 53-93 fath., and 50 miles off do., 234 fathoms.

35. PORELLA COMPRESSA (*Sow.*). (Pl. 11. figs. 3, 4, 5.)

*Millepora compressa*, Sowerby, Brit. Miscell. i. (1806), p. 83, pl. xli.

*Eschara cervicornis*, Busk, Brit. Mus. Cat. p. 92, pl. cix. fig. 7, pl. cxix. fig. 1.

*Eschara cervicornis*, forma *Escharæ*, Smitt, "Krit. Fört." 1867, pp. 23 & 149, pl. xxvi. fig. 138, 139.

*Porella compressa*, Hincks, Brit. Mar. Polyzoa, p. 330, pl. xlv. figs. 4-7, and woodcut; Lorenz, Bryozoen von Jan Mayen, p. 90; Bidentkap, Zool. Jahrb. vol. x. p. 627.

There has been great confusion between this species and the Arctic *Cellepora incrassata*, Sm., and also between these and the Mediterranean *Porella cervicornis*, M.-Ed.; and even Busk, in his List of Polyzoa collected by Captain H. W. Feilden in the North Polar Expedition, gives as *Cellepora cervicornis*, Busk, a form which is probably *C. incrassata*, Sm. Miss Jelly in her Catalogue gives Busk's species under both *C. incrassata* and *P. compressa*, and it seems hopeless to attempt to reduce the synonyms to order. Between *Porella compressa* and *C. surcularis* it is rather a question of names, as the two, although sometimes similar in appearance, are quite distinct in the minute characters. On the other hand, *P. compressa* and *P. cervicornis*

from the Mediterranean are closely allied, but the branches of *P. compressa* are much the broader, and in the British specimens there are several layers of zoëcia in the older parts. In the Arctic specimens the branches are compressed, and about 4 millimetres broad, which is about the same size as those of *P. saccata* and *Escharoides Sarsii*. In *P. cervicornis* there is a bifid denticle on the bar of the avicularium. There are also differences between the mandibles of *Porella cervicornis*, M. Ed., and those of *P. compressa*, which, though not very great, would alone indicate the probability of these being two distinct species.

The Franz-Josef Land specimens have 18 tentacles, and oral glands, but no avicularian glands were seen. There are two distal, and four lateral rosette-plates.

*Loc.* Spitzbergen, Greenland, Jan Mayen (*Lorenz*), Novaya Zemlya, 30-60 fathoms; Kara Sea (*Smitt*); Finland; Norway; Bohus Bay; British seas and north coast of France.

Jackson-Harmsworth Exp.: off Cape Mary Harmsworth, 53-93 fathoms.

36. *PORELLA GLACIATA*, sp. nov. (Figs. 2, 3.)

?*Eschara cervicornis*, forma *Lepraliæ*, *Smitt*, "Krit. Fört." 1867, pp. 23 & 149, pl. xxvi. figs. 136, 137.

A specimen "off the glacier between Cape Flora and Cape Gertrude" is in most respects like *P. inflata*, sp. nov., but the entirely different operculum and mandible show that they are quite distinct (see woodcut, figs. 2 & 3). The operculum is very broad, and has a very muscular ridge, and the mandible corresponds with that of a *Porella* sent to me as *P. propinqua*, Sm. (Pl. 11. fig. 15).

Fig. 1.



Fig. 1. *Lepralia cruenta*.

Fig. 2.



Figs. 2, 3. *Porella glaciated*.

Fig. 3.



There is a row of pores by the border with ridges between the pores as in *P. acutirostris*, Sm. (Pl. 10. fig. 10).

The surface of the zoëcia and of the globular ovicells is granular, the peristome is raised at the side, the avicularian chamber is wide and distinct with the mandible within the peristome, but on the top of a more or less tubular projection.

This may be the *Eschara propinqua*, Smitt (pars), but his figures 131, 132, 134 can hardly represent the same species as figs. 126-128.

Jackson-Harmsworth Exp.: off glacier between Cape Flora and Cape Gertrude, about 30 fathoms.

37. *PORELLA PLANA*, *Hincks*. (Pl. 11. figs 11-13.)

*Porella Skenei*, Ell. & Sol., form *plana*, *Hincks*, Ann. Mag. Nat. Hist. ser. 6, vol. i. p. 221, pl. xiv. fig. 6 (1888).

*Porella concinna*, granular var., *Hincks*, Ann. Mag. Nat. Hist. ser. 6, vol. ix. p. 156, pl. viii. fig. 6 (1892).

The zoarium is bilaminar, foliaceous, though in one small specimen from lat.  $77^{\circ} 55'$  N., long.  $53^{\circ} 20'$  E., 130 fath., there is only the creeping portion from which the colony arises. *Hincks* does not say whether his granular variety of *P. concinna* is foliaceous or encrusting. The shape of the zoecium and also of the secondary orifice is subject to great variation, and numerous round avicularia are scattered over the surface. In the younger zoecia there is an avicularium at the proximal edge of the aperture, and usually one on each side, more or less raised and turning inwards, with a few avicularia on the surface of the zoecium. In older zoecia these avicularia are within the aperture and there may be more than three; the surface is finely granular with large pores round the border of the zoecium; the ovicells, which are also finely granular, are in some cases almost entirely concealed, in others are raised and globular.

There are about 20 tentacles, avicularian glands, and also oral glands.

I cannot agree in considering this a variety of *P. Skenei*, and think it is entitled to specific distinction, though no doubt closely allied to *P. concinna*, Busk.

*Loc.* Gulf of St. Lawrence, Trinity Bay, 96 fath. (*Hincks*).

Jackson-Harmsworth Exp.: Lat.  $77^{\circ} 55'$  N., long.  $53^{\circ} 20'$  E., 130 fath., and also lat.  $77^{\circ} 55'$  N., long.  $53^{\circ} 16'$  E., 130 fath.

38. *PORELLA SKENEI*, var. *PROBOSCIDEA*, *Hincks*. (Pl. 11. figs. 17, 18.)

*Porella proboscidea*, *Hincks*, Ann. Mag. Nat. Hist. ser. 6, vol. i. p. 223, pl. xiv. fig. 4; Nordgaard, Bergens Mus. Aarbog, 1894-5, p. 25, pl. i. fig. 4.

? *Eschara verrucosa*, Smitt, "Krit. Fört." 1867, pp. 22 & 142, pl. xxvi. fig. 135.

From off Cape Mary Harmsworth there are some specimens growing adnate upon *Cellepora incrassata* and *Scrupocellaria*

*scabra*; but only in one or two specimens are the lateral avicularia found, and then only to some of the zoëcia. The suboral avicularium is much raised, the rostrum being continued beyond the avicularium; there are a row of pores round the border of the zoëcium, and the ovicell is wide and not punctured. There are many points of resemblance to *P. concinna*, Busk.

*Loc.* Gulf of St. Lawrence, Orphan Bay, and off Cape Rozier, 38 fath. (*H.*). If this is Smitt's species then also Spitzbergen, Novaya Zemlya and Kola; Finland and North Cape (*Nordgaard*).

Jackson-Harmsworth Exp.: off Cape Mary Harmsworth, 53-93 fathoms.

39. *PORELLA SKENEI*, *Ell. & Sol.*, var. *TRIDENS*, *Kirchenpauer*. (Pl. 11. figs. 6, 7.)

*Cellepora tridens*, Kirchenpauer, Untersuchungs-fahrt der Pommerania, p. 188, figs. *a* & *b*.

? *Eschara Skenei*, var. *tridens*, Busk, Ann. Mag. Nat. Hist. ser. 2, vol. xviii. p. 33, pl. i. fig. 3 (1856).

*Cellepora ramulosa*, Manzoni, "Bry. foss. Ital." Sitzungsber. K. Akad. Wissensch., math.-nat. Cl. vol. lxi. pt. 1, 1870, p. 12, pl. v. fig. 29, pl. vi. fig. 30; Waters (part), Ann. Mag. Nat. Hist. ser. 5, vol. iii. p. 196.

*Palmicellaria Skenei*, var. *tridens*, Hincks, Brit. Mar. Polyzoa, p. 380; Waters, Zool. Chall. Exp. pt. lxxix. p. 36 (vol. xxxi.).

The *Porella Skenei* group does not furnish sharp lines by which the ordinary rather stout *P. Skenei*, E. & S., can be readily distinguished from the less stout form with flattened branches known as *Porella lorea*, Alder, which is somewhat stouter than the present cylindrical form with oral avicularia, usually on well-marked cylindrical processes; the number of these processes in the specimens examined is usually 3, but Kirchenpauer says 4 are frequent. The *Porella elegans*, Alder, is still more delicate, but so far has only been found where a stouter form also occurs.

Smitt united *Porella lorea* (Alder) and *Porella elegans* (Alder) under *Discopora Skenei*; and it is doubtful whether they will permanently be separated, though at present it may be advisable to indicate in which form the growth has taken place, and it must be remembered that the operculum is much wider and shorter in *P. lorea*, Alder, so that perhaps on this account it should be separated. *P. bicornis*, Busk, of the Crag is also closely allied, but it has not been proved to be the same as the erect species.

The operculum of *P. Skenei* is longer in proportion to the width than in most of the typical *Porella* such as *P. lævis*, Fleen. The mandibles have the characteristic diagonal bars and a raised line below.

*Loc.* Of this variety, Bukenfjord (*Kirchenpauer*); off Nova Scotia (*Waters*); Naples and Capri (*Waters*); Norway. [Spitzbergen, *Nordg.*]

Jackson-Harmsworth Exp.: Lat. 77° 55' N., long. 53° 20' E., 130 fathoms.

Other varieties are stated to have been found in Norway, Finland, Spitzbergen, Kara Sea, Jan Mayen, Greenland, Shetland, &c., and the coast of France.

40. PORELLA SACCATA, Busk. (Pl. 10. figs. 8-12, 14-17.)

*Eschara saccata*, Busk, Ann. Mag. Nat. Hist. ser. 2, vol. xviii. p. 33, pl. i. fig. 5.

*Eschara elegantula*, Smitt, "Krit. Fört." 1867, pp. 24 & 154, pl. xxvi. figs. 140-146; Busk, Zool. 'Challenger' Exp., pt. xxx. p. 141, pl. xx. fig. 6; id. Journ. Linn. Soc., Zool. vol. xv. p. 235.

*Porella elegantula*, Levinsen, Bry. fra Kara-Havet, p. 318 (14); Hincks, Ann. Mag. Nat. Hist. ser. 6, vol. i. p. 222, pl. xv. fig. 5; Bidekap, Zool. Jahrb. vol. x. p. 627.

*Lepralia elegantula*, Lorenz, Bry. von Jan Mayen, p. 89.

For other synonyms see Miss Jelly's Catalogue.

As it seemed doubtful whether the *Eschara elegantula* of Smitt is the same as the *E. elegantula* \* of d'Orbigny, I stayed in Paris, *en route*, in order to examine the specimen described by d'Orbigny, and that I found is what Busk has since described as *Porella perpusilla*.

It should not be overlooked that the specimen with which Smitt made the comparison was, according to Smitt, marked "*Eschara fascialis*." The specimen from which no doubt d'Orbigny's description was taken is not so marked, so that I do not gather what Smitt examined.

D'Orbigny's original specimen No. 13622 of *Eschara elegantula* from Newfoundland, now in the Musée d'Histoire Naturelle in Paris, is composed of cylindrical branches between one and two millimetres in diameter, with the ordinary avicularia much smaller than in the more common *P. saccata*, but the mandibles of both are similar (compare Pl. 10. figs. 11, 12, 13). In the Paris specimen already alluded to the avicularia are sometimes

\* *Eschara elegantula*, d'Orbigny, Pal. Franç. vol. v. p. 102.

gigantically developed, to which d'Orbigny referred when he wrote "pourvus latéralement de cellules plus grandes formant une partie dentée" (Pl. 10. fig. 19). These gigantic avicularia have not been found in *P. saccata*, B. A sketch of the colony (which I should call a memorandum sketch) to give an idea of the growth is reproduced, but this is not an exact drawing (Pl. 11. fig. 1). D'Orbigny's species either must stand for the cylindrical form, or, not having been recognized, becomes *P. perpusilla*, B., being of course closely allied to *P. saccata*, B.; but there seems sufficient reason for separation. Unfortunately Busk's figures and descriptions of *P. saccata* are far from satisfactory.

Another specimen marked in pencil "13622 Terre Neuve, *Eschara elegantula*" is probably a mistake, and was not so marked by d'Orbigny.

Fischer unites *E. pavonina*, d'Orb., with *Porella elegantula*, d'Orb., but the specimen 13621 from the Ile de Ré is flabelliform (fig. 2, Pl. 11), with avicularian chambers smaller than those in *P. saccata*, and also has the ovicells imperforate and not much raised.

The Arctic specimens of *P. saccata* which I have examined start from a broad base, and the colonies grow to 3-4 inches in height, with compressed branches about 4 millimetres broad; the branches often gradually curve round, so that they are not all in one plane as described by Busk in his 'Challenger' specimens. On the front of the zoëcium, near the proximal end, there are two pores which open into the avicularian chamber (fig. 14, Pl. 10). These are shown by Smitt in his figure 143, which seems to be from a worn specimen. The pores are not always seen when the zoëcium is covered by the exterior membrane, but in specimens boiled in caustic potash and in sections these pores can be made out, and they can also be distinguished in d'Orbigny's specimen of *P. elegantula* from Newfoundland, and readily in the 'Challenger' specimens.

Sections show that there are very large oral glands which are placed nearer the basal (neural) wall than are the tentacles, that is they are underneath the tentacles, which is not a usual position for the glands. The cells forming these glands often have large vacuoles, and the contents of the glands are the same homogeneous unstainable material which we have seen in other glands. No avicularian glands were found. Specimens from near Wilczek Land, collected 16th or 17th July, 1897, have well-developed ovaria and testes.



There are 16 to 17 tentacles, and one lateral and two distal rosette-plates.

*Loc.* Spitzbergen, 30-65 fath.; Greenland; Finland, 30-60 fath.; Kara Sea, 46-75 fath. (*Levinsen*); Jan Mayen, 140-180 metres (*Lorenz*); Barents Sea (*H.*); Novaya Zemlya; Labrador; Baffin's Bay; off Nova Scotia, 51 fath. (*Challenger*); Murchison Sound, 45 fath. (*Hennig*).

Jackson-Harmsworth Exp.: off glacier between Cape Gertrude and Cape Flora, about 30 fath.; off Northumberland Island; "off L. S. H.," about 15 fath.; near Wilczek Land, 127 fath.

41. *PORELLA ACUTIROSTRIS*, *Smitt.* (Pl. 10. figs. 1-5.)

*Porella acutirostris*, *Smitt*, "Krit. Fört." 1867, p. 21, pl. xxvi. figs. 106-108; *Lorenz*, *Bryozoen von Jan Mayen*, p. 90 (8); *Hincks*, *Ann. Mag. Nat. Hist.* ser. 6, vol. iii. p. 429, pl. xxi. fig. 5.

*Porella major*, *Hincks*, *Ann. Mag. Nat. Hist.* ser. 5, vol. xiii. p. 51 (25), pl. iv. fig. 5.

Specimens from off Northumberland Island, about 15 fath., have the surface of the zoëcium and of the ovicell granulated. The shell when mounted in balsam is very transparent, so that the contents of the avicularian chamber can be readily examined, and the pair of large avicularian glands are seen to extend across a great part of the chamber. This tumid avicularian chamber spreads quite across the zoëcium and contracts at each side. These glands are similar to those of *Lepralia margaritifera*, *Quoy & Gaim.*, and *Lepralia foliacea*, *E. & S.*, though somewhat larger, and, judging from the shape of the avicularian chamber of *P. inflata*, sp. nov., it also doubtless has large glands. The wall of the gland is formed of a layer of nucleated cells, and the contents of the glands are a yellowish homogeneous substance which does not stain. There are 17 tentacles.

*Loc.* Spitzbergen, 16-40 fath.; Greenland (*Sm.*); Jan Mayen, 20-180 metres; St. Lawrence (*H.*); Cumshewa and Houston-Stewart Channel (Queen Charlotte Islands) (*H.*).

Jackson-Harmsworth Exp.: off Northumberland Island, about 15 fath.

42. *PORELLA INFLATA*, nom. nov. (Pl. 10. figs. 6, 7.)

*Porella lævis*, *Smitt*, pars (non *Flem.*), "Krit. Fört." 1867, p. 21, pl. xxvi. figs. 112-114, and probably 109-119.

In the *Hemeschava* stage from "between Cape Flora and

Cape Gertrude, 30 fathoms," the zoëcia are hexagonal, granulated, having a raised avicularian chamber extending across the zoëcium, with the avicularian opening somewhat raised and just within the oral aperture, but directed upwards and with a small round mandible. The mandible has a central lucida, but has no diagonal bars as in *P. lævis* from Shetland (Pl. 11. fig. 14). Through the semitransparent walls of the avicularian chamber no avicularian glands can be seen, though no doubt, from the shape of the chamber, they occur at some seasons at any rate. The peristome is raised at each side, but is not continuous round the edge of the aperture. The ovicell is globular, narrow, much raised, with the granulations more distinct than over the surface of the zoëcium.

The *P. lævis*, var. *subcompressa*, Busk, may be related to *P. lævis* of Fleming, but differs considerably from the Arctic *P. inflata*. The var. *subcompressa* is given by Kirkpatrick as found off Port Phillip, Australia. Although Smitt placed some adnate specimens from various localities under *P. lævis*, forma *lepralia*, he does not seem in any way to have shown that there was any identity with the erect *P. lævis*, Flem., and further seems to have placed two or three species together as *P. lævis*.

*Loc.* Spitzbergen, 20-30 fath. (*Sm.*); Bohus Sea; Norway; Finland.

Jackson-Harmsworth Exp.: between Cape Flora and Cape Gertrude, 30 fath.

#### 43. PORELLA? OBESA, sp. nov. (Pl. 12. figs. 22-24.)

A specimen from off Elmwood, encrusting a *Balanus*-shell, has a thick shell with finely granulated surface, and pores round the border which can only be seen in the younger zoëcia. The avicularian chamber is wide, extending to the edge of the zoëcium, but the outline can only be seen in the younger zoëcia; in the same way the ovicell is raised in the younger zoëcia, but in the older ones is quite depressed; and the operculum does not close the aperture of the ovicell. There are pore-chambers, 6-8 in all. The lower edge of the operculum makes a large curve, indicating that there is a broad sinus to the oral aperture, and there are two muscular dots a short distance from the border of the operculum. The characters of the operculum would suggest that the species should be placed under *Schizoporella*, and near what we may call the *S. biaperta* group. The small avicularian

mandible also has not the cross thickenings characteristic of typical *Porella*, but has a central lucida. There is, however, a small group, left for the present doubtfully under *Porella*, though probably a genus will have to be made for it when it is fully worked up. In this group the avicularian chamber is very broad, and in the species which have been studied contains a pair of large avicularian glands. The opercula, instead of the long muscular ridges of typical *Porella*, has muscular dots which may be a little elongate. The mandibles have no cross bars, but have a central lucida. The group at present consists of *P. saccata*, Busk, *P. acutirostris*, Sm., *P. obesa*, sp. nov., *P. inflata*, sp. nov., and probably *P. (Lepralia) margaritifera*, Quoy & G., and *P. marsupium*, MacG.

44. ESCHAROIDES SARSII, Smitt. (Pl. 11. figs. 21-23.)

*Escharoides Sarsii*, Smitt, "Krit. Fört." 1867, pp. 24 & 158, pl. xxvi. figs. 147-154.

I do not think that either *Eschara grandipora* of Blainville or *E. lobata* of Lamarck are synonyms.

Smitt gives the avicularium as triangular, and on this ground it is separated from *E. rosacea*, Busk; but in the specimens now examined, and also in a specimen from the Gulf of St. Lawrence, the mandible is rounded at the distal end, though Hincks speaks of the pointed mandible. Looking down on the avicularium, it may appear triangular, but none of the mandibles that I have been able to examine, either in my own collection or in the British Museum, including the one described by Ridley from Franz-Josef Land and the 'Challenger' specimens, have I seen a triangular mandible or one that could be called "acute." With these very small avicularia a mistake is easily made unless the mandible is prepared out. The mandibles are not symmetrical and the amount of irregularity varies, as also the size; but in the Chilostomata the avicularia generally are subject to considerable variation in size, whereas as a rule the opercula are in a species all of one size, often in a specimen all the opercula seem to correspond in size most exactly.

The operculum is thin, transparent, membranous, with a thickened bar across.

The ovicell is but little raised, and sometimes there is an elongate area in front. The small avicularium occurs within the peristomial aperture.

Some branching pieces of *E. Sarsii*, Sm., and *Porella compressa*.

Sow., from the same locality are undistinguishable from the shape of the colony; and when dealing with the earlier descriptions, where the form of growth was considered the most important character, it is impossible to judge which species is referred to. It is also said to occur encrusting shells and stones.

There are 16 tentacles. There are small oral glands which seem to be attached to the sheath. The contents of the pore-tubes at a slight distance from the external surface of the zoecium are large elongate cells, with a central nucleus, but near the surface the cells are smaller.

A figure of the operculum (fig. 25) and mandible (fig. 24) of *Escharoides rosacea*, Busk, from Loch Tyne is given for comparison. The operculum of *rosacea* has a thin muscular ridge at each side and the lower edge of the operculum is nearly straight. The mandible is semicircular, and has a small median lucida and a thinner part at each side, both opercula and mandible being of the *Porella* type. The mandible in *rosacea* is however lateral instead of being median.

I have referred at some length under *Cribrilina punctata*, Hass. (p. 62), to the three species of common Arctic Bryozoa said to have been found in the Antarctic by Hooker, in the 'Erebus' and 'Terror,' and have suggested the probability of an error in labelling having occurred.

The mandibles of the 'Erebus' and 'Terror' specimen are characteristic of *E. Sarsii*, and fall within the range of the Arctic specimens examined.

*Loc.* Spitzbergen, 20-60 fath.; Greenland; Finland (*Sm.*); Kara Sea, 49-65 fath. (*Levinsen*); Jan Mayen, 160-180 metres (encrusting, no avicularia); Franklin Pierce Bay, Smith's Sound, 13 fath. (*Busk*); Gulf of St. Lawrence (*Hincks*); Northumberland Island (*Hennig*); off Franz-Josef Land, lat. 79° 55' N., long. 51° 0' E. (*Ridley*). According to Hooker and Busk, lat. 74° 0' S., long. 172° 0' E., 330 fath.

Jackson-Harmsworth Exp.: off glacier between Cape Flora and Cape Gertrude, about 30 fath.; off Cape Mary Harmsworth, 53-93 fath.

#### 45. PORINA TUBULOSA, Norman.

*Lepralia tubulosa*, Norman, Rep. Brit. Assoc. 1868, p. 308.

*Anarthropora monodon*, forma *minuscula*, Smitt, "Krit. Fört." 1867, pp. 7 & 65, pl. xxiv. figs. 20 & 22.

For other synonyms see Miss Jelly's Catalogue.

The suboral pore enters the peristome above the operculum.

The oral aperture has a small tooth on each side, forming a Sebizoporellidan aperture.

*Loc.* Spitzbergen, 30–50 fath.; Barents Sea (*D'Urban*); Jan Mayen, 15–180 metres; Davis Straits, 100 fath. (*H.*); Gulf of St. Lawrence (*H.*); Shetland and Wick.

Jackson-Harmsworth Exp.: off Elunwood  $\frac{2}{3}$  mile, 18 fath.; Günther Sound, 10 fath.; nr. Wilczek Land, 127 fath.

46. *MICROPORELLA SPATULIFERA* (*Smitt*). (Pl. 12. fig. 6.)

*Lepralia spatulifera*, Smitt, "Krit. Fört." 1867, pp. 20 & 124, pl. xxvi. figs. 94–98; Lorenz, "Oest. Polarstation Jan Mayen," p. 89.

There is one specimen from near Wilczek Land, and I have one in my collection from the Gulf of St. Lawrence, sent to me by Canon Norman, and in both cases there is in many zoëcia below the club-shaped process a tubular pore or perhaps avicularium, and it would seem that the species should be removed from *Lepralia* to *Microporella*. The shape of the aperture is that of *Microporella*, and not of *Porina*. The zoëcia and the ovicells are punctate, with one pair of stout spines and one pair of thinner ones above the oral aperture, and one or two small oval avicularia at the side of the aperture. The operculum is thin and does not show the subtriangular shape of the aperture, the distal end is round and the sides are nearly straight. The ovicell is not much raised, in fact sometimes not at all. The wide club-shaped process is articulated.

The specimen was so loaded with grains of sand, that it was hopeless to attempt to cut sections.

Hincks in his papers on the St. Lawrence Bryozoa does not mention this species.

*Loc.* Spitzbergen (*Sm.*); Finland (*Sm.*); Jan Mayen, 100–180 metres (*Lorenz*); Gulf of St. Lawrence (*A. W. W. coll.*).

Jackson-Harmsworth Exped.: nr. Wilczek Land, 127 fathoms, on shell.

47. ?*SMITTIA JACKSONII*, nom. nov. (Pl. 12. fig. 18.)

*Mucronella coccinea*, Bidentkap, Bry. von Ost-Spitzbergen, Zool. Jahrb. vol. x. p. 624, pl. xxv. figs. 5, 6.

Wherever it may ultimately be placed, it seems advisable that this Arctic form should be recorded either as a species or variety. In some points it differs decidedly from the British and Mediterranean *Mucronella coccinea*, Abild.; but it is waste of time trying to decide what Abildgaard meant, in consequence of his meagre description and figures.

As pointed out by Bidekap, there are 4 oral spines, whereas in the British and Mediterranean *M. coccinea* there are usually 6, though in a beautiful specimen of the tessellated variety from Etrétat there are only 4. I have been unable to find any lyrula (central denticle); there is a sinus in the much raised secondary aperture, and internal thickenings on both sides of the sinus. There are about 8 pore-chambers to each zoëcium, and 20–21 tentacles. The ovicell is smaller than in the Naples *M. coccinea*, but the shape of the zoëcia and avicularia is similar, and the surface is coarsely granulated. Growing on *Diastopora intricaria* there are the primary and the second zoëcium of a *Smittia*, which no doubt is the *S. Jacksonii*. The primary has 13 spines, and the second zoëcium with the mucro much raised has 8 spines. The Naples and British *coccinea* has 12–13 spines to the primary zoëcium. In the sections cut no glands are recognized.

This in many respects is similar to *Smittia præstans*, Hincks, from Australia, especially in the shape of the peristomial sinus (see my figure, Ann. Mag. Nat. Hist. ser. 6, vol. iv. pl. iii. fig. 7).

*Loc.* Spitzbergen.

Jackson-Harmsworth Exp.: Lat. 77° 55' N., long. 55° 25' E., 115 fath.; lat. 77° 55' N., long. 53° 20' E., 130 fath.

48. SMITTIA TRISPINOSA, var. LAMELLOSA (*Smitt*). (Pl. 12. figs. 19–21.)

*Escharella Jacotini*, forma *lamellosa*, Smitt, "Krit. Fört." 1867, pp. 11 & 86, pl. xxiv. figs. 53–57.

*Lepralia Jeffreysii*, Norman, Proc. Roy. Soc. vol. clxxiii. p. 208.

*Lepralia trispinosa*, Johnst., var., Hincks, Ann. Mag. Nat. Hist. ser. 4, vol. xix. p. 100, pl. xi. fig. 1.

*Smittia trispinosa*, var. *arborea*, Levinsen, Bry. fra Kara-Havet, p. 320 (16), pl. xxvii. figs. 7, 8.

This form should at present be kept distinct, whether we call it *S. lamellosa*, or only a variety. In the Arctic region it seems usually to form erect tubular zoaria. The zoëcia are nearly flat and the secondary aperture is not raised, the aperture having a quadrate appearance. The avicularia are triangular, and are directed upwards, usually by the side of the aperture. The ovicells have sometimes a few large perforations as in *S. trispinosa*. There are 17 tentacles and about 14 lateral rosette-plates. There are oral glands; and in the section cut it looks as though there were two pairs, one close up to the diaphragm and one connected with the tentacular sheath lower down.

*Loc.* Spitzbergen (*Smitt*); Greenland, 100 fath. (*Norman* &

*Hennig*); Kara Sea (*Levinsen*); Davis Straits, 100 fath. (*Hincks*); Dogger Bank (*Hincks*); Reykjavik Harbour, 15-20 fath. (*Wallich*).

Jackson-Harmsworth Exp.: Lat. 77° 55' N., long. 53° 16' E., 130 fath.

Lorenz mentions *S. trispinosa*, Johnst., from Jan Mayen, 160-180 metres.

49. SMITTIA PEACHII, *Johnston*.

*Discopora coccinea*, forma *Peachii*, Smitt, "Krit. Fört." pp. 26 & 170, pl. xxvii. fig. 164; & fig. 167 (as *ventricosa*).

From off Elmwood there are specimens of what may be called very typical *S. Peachii*, Johnst. There are six spines, the surface is granular, and the mucro is distinct. The determination, or rather separation, of *S. Peachii*, Johnst., *S. ventricosa*, Hass., and *S. variolosa*, Johnst., is always a great difficulty, although I have typical specimens of all three. Hincks says that Lorenz has united *S. Peachii* and *S. ventricosa*. This does not seem to have been done by Lorenz, though it has been indicated by others. The genus *Mucronella* is based upon the presence of a mucro; but various authors place *Discopora emucronata*, Sm., with *S. Peachii*, showing the artificiality of the distinction based upon the presence of a mucro.

*Loc.* Various Arctic localities; Kola, Jan Mayen, Gulf of St. Lawrence (*Dawson*). Abundant on the British, French, Danish, and Scandinavian coasts, and is given by Pergens from the Mediterranean. Specimens in my collection from Capri are the var. *octodentata*, Hincks.

Jackson-Harmsworth Exp.: off Elmwood, on basalt and on *Balanus*, 18 fath.

50. SMITTIA VENTRICOSA (*Hass.*), var. (Pl. 12. fig. 17.)

*Mucronella ventricosa*, Hincks, Brit. Mar. Polyzoa, p. 363, pl. 1. figs. 6-8.

From off the glacier between Cape Flora and Cape Gertrude there is a *Smittia* which I think must be considered as a variety of *S. ventricosa*, Hass. It is growing on *Hornera*, and the shape of the large, finely granulated zoecia is variable, often being elongate. The border at the upper part of the aperture is raised, sometimes forming a kind of cap, and near the distal border there are four spines; whereas in *S. Peachii* there are usually six and in *S. ventricosa* four or six, but in both cases the spines are usually lower down. The mucro is not very wide. There are 18 tentacles. I must however confess to never feeling sure in

the determination of *S. Peachii* and *S. ventricosa*, and do not know of any characters by which they can be satisfactorily distinguished.

An examination of the specimen from Franz-Josef Land which Ridley called *Mucronella ventricosa* var. *connectens*, shows the pore-chambers distinctly, and these Ridley termed fenestræ, but they do not furnish any ground for separation as a variety.

The *S. ventricosa* has been found from various Arctic localities, and is common from the British and French coasts, and Manzoni records it from the Mediterranean.

51. SMITTIA LANDSBOROVII, *Johnst.*, var. (Pl. 12. fig. 7.)

There is a small encrusting specimen from off Elmwood, 18 fathoms, which seems to be a variety of *S. Landsborovii*. Above the distal border of the oral aperture there is a projecting hood to most zoëcia, and in the ovicelligerous zoëcia this is attached to and extends below the ovicell. The surface of the zoëcium is punctured with large pores.

There has been much confusion concerning *S. Landsborovii*, especially in the Arctic regions, as no doubt several distinct species were alluded to by Smitt under his *Escharella Landsborovii*, and in Busk's British Museum catalogue a mistake was made between *S. reticulata*, MacG., and *S. Landsborovii*.

The type occurs off the British seas, in the Mediterranean, Australia, New Zealand; and Ortmann gives it as from Japan.

*Smittia reticulata*, MacG., *S. reticulo-punctata*, Hincks, *S. trispinosa*, *Johnst.*, *S. rigida*, Lorenz, *S. abyssicola*, Norm., have been mentioned from Arctic localities.

52. ? PHYLACTELLA LABIATA (*Smitt*). (Pl. 12. figs. 3 & 4.)

*Discopora coccinea*, forma *labiata*, *Smitt*, "Krit. Fört." 1867, pp. 27 & 175, pl. xxvii. fig. 176.

*Discopora labiata*, *Smitt*, *op. cit.* 1878, p. 23.

*Mucronella labiata*, *Levinsen*, *Bry. Kara-Havet*, p. 323; *Bidenkap*, *Bry. von Ost-Spitzbergen*, p. 610.

*Phylactella grandis*, *Hincks*, *Ann. Mag. Nat. Hist. ser. 5, vol. vi. p. 280*, pl. xv. figs. 4, 5.

Although probably *Phylactella*, which is so largely based upon peristomial characters, will not be found to be a satisfactory genus as now understood, it has seemed better to leave *P. labiata* here rather than place it under *Smittia*.

The peristome in front is much raised and entire, but behind it is not raised, and there there are four long spines. There is a



row of small pores round the zoecium, and the surface of the zoecia and ovicells is finely granulated. The larvæ are large and are more fully developed within the ovicell than is usual; in fact, I have not come upon larvæ as largely developed in any other species, the corona and cilia being very distinct. A sketch (Pl. 12. fig. 5) of a free swimming larva of *Schizoporella unicornis*, Johnst., is given for comparison of the size.

There are 21 tentacles; while in a Mediterranean *Phylactella*, which is probably a variety of *collaris*, there are 15 tentacles. In the aperture there is a wide lyrula.

*Loc.* Spitzbergen (*Sm.*); Kara Sea (*Sm. & Lev.*), 40-125 fath.; Barents Sea, 160 fath. (*H.*); Finland (*Sm.*).

Jackson-Harmsworth Exp.: off glacier between Cape Flora and Cape Gertrude, about 30 fath.; lat.  $77^{\circ} 55' N.$ , long.  $55^{\circ} 25' E.$ , 115 fath.; lat.  $77^{\circ} 55' N.$ , long.  $55^{\circ} 20' E.$ , and  $55^{\circ} 16' E.$ , 130 fath.

#### RHAMPHOSTOMELLA.

Has a very narrow lyrula, and the fact of its presence indicates the relationship with *Smittia*, and probably it must be placed in the family *Smittiidæ*. The operculum is thin and delicate, as in *Smittia*, but there is a raised circular ridge reminding us somewhat of the operculum of *Membranipora hians*, Hincks. The mandibles in some characters approach to those of some *Celleporæ*, as *C. pertusa*, Smitt.

53. RHAMPHOSTOMELLA COSTATA, *Lorenz.* (Pl. 11. figs. 26, 27; Pl. 12. figs. 1, 2.)

*Cellepora scabra*, Smitt, "Krit. Fört." 1867, pp. 30 & 181, pl. xxviii. figs. 186 & 188.

*Rhamphostomella costata*, Lorenz, Bry. von Jan Mayen, p. 94, pl. vii. fig. 11 (in error 12 in text); Hincks, Ann. Mag. Nat. Hist. ser. 6, vol. iii. p. 426, pl. xxi. figs. 6, 7, 8.

In the Franz-Josef Land specimens, there is a small lyrula, which is slightly bifid, and the suboral rostrum sometimes spreads out at the top as described by Hincks. The gigantic avicularia described by Hincks are very abundant, but the rostral avicularia are usually smaller than in my specimen from the Gulf of St. Lawrence, while the gigantic avicularia are more recumbent. There are no oral spines in the specimens examined. There are 18 tentacles; and the oral glands are well-developed, consisting of two parts: the first, the pendulous part arising from close to the diaphragm (figs. 1, 2), shows no distinct structure, though there

are indistinct traces of a lobular structure and of large cells; to the base of this is attached the second or globular part, in which there are distinct nucleated cells. This division into two separate parts is indicated in the oral glands of many species, and is very distinct in a few, as in *Lepralia eliminata*, Waters.

I am very doubtful whether *R. costata* should be separated from *R. scabra*, Smitt, and think Lorenz has made more species than will stand, but I have not the material for a complete study of this Arctic genus.

*Loc.* Gulf of St. Lawrence (*H.*); Jan Mayen (*Lor.*); Finland.

Jackson-Harmsworth Expedition: off Cape Gertrude, 30 fath.; off Cape Mary Harmsworth, 53-93 fath.

54. RHAMPHOSTOMELLA PPLICATA (*Smitt*). (Pl. 11. figs. 28, 29.)

*Cellepora plicata*, Smitt, "Krit. Fört." 1867, pp. 30 & 184, pl. xxviii. figs. 189-191; Hincks, Ann. Mag. Nat. Hist. ser. 4, vol. xix. p. 106, pl. xi. figs. 3, 4.

*Smittia plicata*, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. xiii. p. 52.

*Rhamphostomella plicata*, Lorenz, Bry. von Jan Mayen, p. 94; Hincks, Ann. Mag. Nat. Hist. ser. 6, vol. iii. p. 426.

? *Cellepora bilaminata*, Hincks, Ann. Mag. Nat. Hist. ser. 4, vol. xix. p. 111, pl. xi. figs. 6, 7.

? *Rhamphostomella bilaminata*, Lorenz, Bry. von Jan Mayen, p. 95, pl. vii. fig. 10.

It is difficult to decide upon the range of variation in *Rhamphostomella*, but it seems as if the species *plicata* must stand, and *R. bilaminata* appears like a vigorous growth of the same, though the absence of spines may be a ground for separation as a variety. At first I named a piece from off Cape Mary Harmsworth *R. bilaminata*, but afterwards put it under *R. plicata*. The zoecium of *R. plicata* is usually nearly smooth, the peristome is much raised, forming a triangular peristomial aperture with a spine on each side, and a minute lyrula within the aperture. There are oral glands close to the tentacular sheath, and there are 17 tentacles.

*Loc.* Spitzbergen, Greenland, and Finland (*Sm.*); Jan Mayen (*Lorenz*); Davis Straits (*H.*); Gulf of St. Lawrence (*H.*); Cumshewa, 20 fath. (Queen Charlotte Islands) (*H.*).

Jackson-Harmsworth Exp.: off glacier between Cape Gertrude and Cape Flora, about 30 fath.; near Wilczek Land, 127 fath.; off Cape Mary Harmsworth, 53-93 fath.

## CELLEPORA.

From the genus *Cellepora* of some years ago, say the time of Busk's British Museum Catalogue, some groups have been separated: first the *Rhynchopora*, Hincks; then I have\* shown that others should be removed to *Lagenipora* of Hincks; Lorenz has made the genus *Rhamphostomella* for an Arctic group. Jullien † created the genus *Osthimosia* for species having a fairly wide sinus in the oral aperture; and later in the same year ‡ MacGillivray divided the *Celleporæ* into holostomatous and schizostomous, leaving those with a nearly straight proximal edge in the aperture as *Cellepora*, calling the rest *Schismopora*. The *Cellepora* of MacGillivray is not represented in the Arctic regions, and only by one or two species in the Northern hemisphere, while they are abundant in the Southern. As I have more than once pointed out, it is unfortunate that MacGillivray did not give a generic name to the holostomatous group, leaving the rest as *Cellepora* to be again reduced as fresh generic characters are found. The *Cellepora* of all the older authors does not remain in the genus of MacGillivray, and as the genus *Osthimosia* was earlier than *Schismopora*, we ought perhaps to accept it, and make a genus *Holostomata* for the *Cellepora* of MacGillivray. All the *Celleporæ* with nearly orbicular apertures, or with a distinct sinus in the aperture, have two muscular dots some distance from the border. This is a character which does not occur in the genus *Lepralia*, but is general in *Schizoporella*; though until the genus *Schizoporella* has been thoroughly worked out, the last word cannot be said about the classification of the *Celleporidæ*. A few so-called *Cellepora* have been removed to *Porella*. Hoping to be able before long to revise the family *Celleporidæ*, it has seemed better to leave the three species at present under *Cellepora*, though all may have to be ultimately called *Osthimosia*, Jull.

## 55. CELLEPORA INCRASSATA, Smitt. (Pl. 12. figs. 11-14.)

*Celleporaria incrassata*, Smitt, "Krit. Fört." 1867, pp. 33 & 198, pl. xxviii. figs. 212, 216.

*Cellepora incrassata*, Smitt, *op. cit.* 1878, No. 3, p. 20; *op. cit.* 1878, No. 7, p. 29; Hincks, *Ann. Mag. Nat. Hist. ser. 4, vol. xix. p. 105*; Levinsen, *Bry. Kara-Havet*, p. 324 (20); Nordgaard, "System. fort. over de i Norge, hidtil. observ. art. af Mar. Polyzoa," *Bergens Mus. Aarbog*,

\* *Journ. R. Micr. Soc.* 1899, p. 8.

† *Mission du Cap Horn, Bryozoaires*, p. 64.

‡ *Zool. of Victoria, decade xvii. p. 241.*

1894-5, No. 2, p. 33; Stuxberg "Faunan på och kring Novaja Semlja," Vega-Exp. vol. v. 1887, p. 179; Bidentkap, Zool. Jahrb. vol. x. p. 629.

*Cellepora cervicornis*, Busk, Ann. Mag. Nat. Hist. ser. 2, vol. xviii. p. 32, pl. i. fig. 1; id. Journ. Linn. Soc., Zool. vol. xv. p. 238; Lorenz, Bry. von Jan Mayen, p. 95, pl. vii. fig. 12.

*Celleporaria surcularis*, Packard, "List of Labrador Marine Animals," Canadian Naturalist, vol. viii. p. 410.

In both the Mediterranean and Arctic region there is a common species of solid cylindrical *Cellepora* composed of several layers, branching dichotomously, the ends of which are frequently tapering. By the naked eye, species from these two localities cannot be distinguished, and in consequence there has been much confusion, but they are by no means identical and the differences must be recorded. The *Cellepora incrassata*, Lamk., is stated by Lamarck to be a Mediterranean species, and this is probably what I have considered to be the *C. coronopus*, S. Woods; and as the minute characters enabling it to be distinguished were first given by Woods and Busk, I consider that this name should stand for the recent Mediterranean form, as Lamarck's description was quite insufficient. Busk, with a meagre description, named the Arctic form *Cellepora cervicornis*, and in his paper in the Journal of this Society, 1881, considers that it is not the same as the Mediterranean *C. incrassata*, as figured by Marsigli. Unfortunately there has been so much confusion between various forms that have been called *Cellepora cervicornis* and *Eschara cervicornis*, that it would only add to it to retain the name, as Busk himself indicated. The Arctic species has been considered to be the *Celleporaria* of Packard, and this probably is the case, though he says two or three lines in thickness, and does not give the characters which we now look for. In *C. coronopus*, W., from the Mediterranean there are large vicarious avicularia with spatulate mandibles and other avicularia with triangular mandibles of varying sizes\*. In *C. incrassata* there are very large vicarious spatulate avicularia, and also very large vicarious semicircular avicularia, besides the small oral avicularia with semicircular mandibles. In *C. incrassata* there is a small avicularium at each side of the oral aperture, whereas in *C. coronopus* there is a small avicularium to one side of the sinus.

The ovicells of *C. incrassata* are imperforate with an area in

\* Waters, "On the Use of the Avicularian Mandibles in the determination of Chilostomatous Bryozoa," Journ. R. Micr. Soc. ser. 2, vol. v. pl. xiv. figs. 29, 30

front, whereas the prominent small ovicells of *C. coronopus* from the Mediterranean have a number of large pores over the surface.

*C. incrassata* has 17 tentacles.

In the Southern hemisphere there are two solid cylindrical *Celleporæ*. The *C. conica*, Busk, which does not differ much from *C. avicularis*, H., has two oral avicularia, the mandibles of which are semicircular, whereas in *C. avicularis* and *C. coronopus* they are triangular. There are spatulate vicarious avicularia, and perforate globular ovicells. The *C. cylindriciformis*, Busk, has perforated ovicells, a large oral avicularium with triangular mandible rather to the side of the aperture, and also vicarious spatulate avicularia.

*Loc.* Spitzbergen, 16-160 fath. (*Sm.*); Greenland (*Sm.*); Novaya Zemlya, 30-80 fath. (*Sm.*); Matotschkin Schaar, 30-50 fath.; Kara Sea (*Levinson*); Kola, 28-100 fath. (*Sm.*); Jan Mayen (*Lorenz*); Finland (*Sm.*); Norway (*Nordgaard*); Labrador, Davis Straits (*H.*); ? Newfoundland (*d'Orb.*).

Jackson-Harmsworth Exp.: off glacier between Cape Gertrude and Cape Flora, about 30 fath.; Wilczek Land, 127 fath.; off Cape Mary Harmsworth, 53-93 fathoms.

56. CELLEPORA PUMICOSA, *Busk*. (Pl. 12. figs. 15, 16.)

*Cellepora pumicosa*, Busk, Brit. Mus. Cat. p. 86, pl. ex. figs. 5, 6; Hincks, Brit. Mar. Polyzoa, p. 398, pl. liv. figs. 1-3; Waters, Ann. Mag. Nat. Hist. ser. 5, vol. iii. p. 198.

As it is extremely doubtful whether *C. pumicosa*, Linn., is referable to this species, it will be best to accept the first reliable description and figure, and call it Busk's species. The genus does not seem to be a genus of Fabricius, as it was previously employed by Linné.

The specimens from Franz-Josef Land have larger zoœcia than those from the Mediterranean and British seas, the avicularium is also larger, as are the opercula and mandibles. The ovicells are widely open, imperforate or with one, two, or three large pores. It seems almost impossible to find any satisfactory characters for separating *C. pumicosa*, B., *C. armata*, H., and *C. ramulosa*, L.; but in what I have considered *C. pumicosa* the proximal border of the operculum is the arc of a circle nearly as large as that of the distal edge, whereas in *C. armata* and *C. ramulosa* the distal edge fits into what may be called a wide sinus. In all, the oral rostrum may be much longer than is shown in any of the figures with which I am acquainted; and in a specimen

sent to me by Joliet, from Roscoff, as *C. ramulosa* there is a long spinous process beyond the mandible.

This seems to be represented in the Southern hemisphere by the *Cellepora Eatoniensis* of Busk, since described by Jullien as *Osthimosia eveza*, Jull.

*Loc.* British seas ; Mediterranean.

Jackson-Harmsworth Exp. : Lat. 77° 55' N., long. 55° 25' E., 115 fath. ; lat. 77° 55' N., long. 53° 16' E., 130 fath. ; 50 miles N.W. Cape Mary Harmsworth, 234 fath.

57. CELLEPORA VENTRICOSA, *Lorenz.* (Pl. 12. fig. 10.)

*Cellepora ventricosa*, *Lorenz*, Bry. von Jan Mayen, p. 96, pl. vii. fig. 13.

The zoëcia of this species are much larger than those of *C. incrassata*, *Smitt*, and the two species can be distinguished by the naked eye. The operculum is also longer, and the ovicell is narrow and imperforate. There are 21 tentacles. In the Cape Mary Harmsworth specimens I do not find any vicarious avicularia, nor does *Lorenz* mention any.

*Loc.* Jan Mayen (*Lorenz*).

Jackson-Harmsworth Exp. : off Cape Mary Harmsworth, 53-93 fathoms.

58. RETEPORA CELLULOSA (*L.*). (Pl. 12. figs. 8, 9.)

*Retepora cellulosa*, *Smitt*, "Krit. Fört." 1867, pp. 35 & 203, pl. xxviii. figs. 222-225 ; *Waters*, *Medit. & New Zealand Reteporæ*, *Linn. Soc. Journ.*, Zool. vol. xxv. p. 259, pl. vi. figs. 17 & 20, pl. vii. fig. 12 ; *Bidenkap*, Bry. von Ost-Spitzbergen, *Zool. Jahrb.* vol. x. p. 630.

From off Cape Mary Harmsworth there is a piece about 22 inches in diameter spreading out and forming a rather flat expansion. I am unable to find any oral spines, nor did *Bidenkap* find any in his Spitzbergen specimens, whereas they are readily found in the Mediterranean *R. cellulosa*. Also the operculum does not widen towards the proximal border so much as in the Mediterranean specimens. These differences are interesting, but are not thought to furnish sufficient ground for separation ; and it is curious that this species, common in the Arctic and the Mediterranean, is not found off the British coasts.

*Loc.* Spitzbergen, 19-35 fath., Greenland, Kara Sea, Norway, Adriatic, Naples, Capri, Rapallo, Villefranche-sur-Mer.

Jackson-Harmsworth Exp. : off Cape Mary Harmsworth, 53-93 fath.

59. *RETEPORA ELONGATA*, Smitt.

*Retepora cellulosa*, forma *notopachys*, var. *elongata*, Smitt, "Krit. Fört." 1867, pp. 36 & 204, pl. xxviii. figs. 226-232.

*Retepora elongata*, Levinsen, Bry. fra Kara-Havet, p. 323 (19), pl. xxvii. fig. 11; Bidekap, Bry. von Ost-Spitzbergen, Zool. Jahrb. vol. x. p. 629; Waters, Journ. Linn. Soc., Zool. vol. xxv. p. 256, pl. vi. figs. 9, 10; Hennig, Öfv. af K. Vetensk.-Ak. Förh. 1896, p. 361.

*Discopora elongata*, Smitt, Öfv. af K. Vetensk.-Ak. Förh. 1878, pp. 25 & 32.

*Retepora Wallichiana*, Hincks, Ann. Mag. Nat. Hist. ser. 4, vol. xix. p. 107, pl. xi. figs. 9-13, 1877; id. *op. cit.* ser. 5, pp. 29 & 42; Nordgaard, Mar. Polyzoa, Bergens Museums Aarbog, 1894-5, No. 2, p. 31.

*Retepora tenella*, Ortmann, Die Japanische Bryozoen-fauna, Arch. f. Naturgesch. 1890, p. 34, pl. ii. fig. 21.

There are 15 tentacles, and large oral glands hanging down from the diaphragm a long way into the zoecium. A specimen from off Cape Mary Harmsworth (Aug. 7th) has the ovaria and testes well-developed.

*Retepora Beaniana*, King, has been found off Jan Mayen.

*Loc.* Spitzbergen, 20-80 fath. (*Sm.*); Greenland; Finland, 50 fath.; Kara Sea (*L.*); Kola (*Sm.*); Novaya Zemlya, 30-50 fath. (*Sm.*); Matotschkin Schaar (*Sm.*, *Stuxb.*); Davis Straits (*H.*); Godthaab, 150 fath.; Murchison Sound (*Hennig in litt.*); Queen Charlotte Islands, 15-20 fath. (*H.*); Vancouver Island (*H.*); Inglefeld Gulf, 25 fath. (*Hennig*); Sagamibai, Japan, 200 fath. (*Ortmann*).

Jackson-Harmsworth Exp.: off Cape Mary Harmsworth, 53-93 fath.







	Page.	Tentacles.	No. 1 Station.	No. 2. Wilezek.	No. 3. Lat. 77° N.	Cape Mary Harmsworth.													
						No. 4.													
						53-93 fms.	234 fms.		Greenland.	Finland.	Spitzbergen.	Kara Sea.	Novaja Semlya and Barents Sea.	Labrador and Gulf of St. Lawrence.	Jan Mayen.	British.	Mediterranean.		
43. <i>Porcella ? obesa</i> , sp. nov. ....	84	...	*	*	...	...	...	...	*	*	*	*	...	...	...	...	...	...	
44. <i>Escharoides Sarsii</i> , Sm. ....	85	16	*	...	...	*	...	...	*	*	*	*	...	...	...	...	...	...	
45. <i>Porina tubulosa</i> , Norm. ....	86	..	*	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
46. <i>Microporella spatulifera</i> (Sm.)	87	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
47. <i>Smittia Jacksonii</i> , nom. nov.	87	20-21	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	
48. " <i>trispinosa</i> , var. <i>lamel-</i>																			
<i>losa</i> (Sm.) .....	88	17	...	...	*	...	...	...	*	...	*	*	...	...	...	...	...	...	
49. " <i>Peachii</i> , Johnst. ....	89	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
50. " <i>ventricosa</i> (Hass.), var.	89	18	*	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
51. " <i>Landsborovii</i> , J., var. ..	90	...	*	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
52. <i>Phylactella labiata</i> (Sm.) .....	90	21	*	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	
53. <i>Rhampostomella costata</i> , Lor.	91	18	*	*	...	*	...	...	...	...	...	...	...	...	...	...	...	...	
54. " <i>plicata</i> (Sm.) .....	92	17	*	*	...	*	...	...	...	...	...	...	...	...	...	...	...	...	
55. <i>Cellepora incrassata</i> , Sm. ....	93	17	*	*	...	*	...	...	...	...	...	...	...	...	...	...	...	...	
56. " <i>punicosa</i> , Busk. ....	95	18-20	...	...	*	...	*	...	...	...	...	...	...	...	...	...	...	...	
57. " <i>ventricosa</i> , Lorenz. ....	96	21	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	
58. <i>Retepora cellulosa</i> (L.) .....	96	12	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	
59. " <i>elongata</i> , Sm. ....	97	15	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	

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## EXPLANATION OF THE PLATES.

## PLATE 7.

- Fig. 1. *Brettia frigida*, sp. nov.,  $\times 12$ . Off Cape Mary Harmsworth.  
 2. Do.; natural size.  
 3. Do. Dorsal surface showing the distal rosette-plate, through the transparent wall,  $\times 25$ .  
 4. *Gemellaria loricata* (L.); Günther Sound. This shows the creeping zoecia from which the branches arise.  $\times 12$ .  
 5. *Brettia minima*, sp. nov.;  $\times 12$ . Off Cape Mary Harmsworth.  
 6. Do.; natural size.  
 7. Do. Dorsal surface,  $\times 25$ .  
 Figs. 8, 9. *Scrupocellaria Smittii* (Norman);  $\times 25$ . 50 miles N.W. Cape Mary Harmsworth.  
 Fig. 10. Do. Avicularium with mandible,  $\times 85$ .  
 11. Do. Avicularian opening,  $\times 85$ .  
 12. *Scrupocellaria ternata*, var. *gracilis*, Sm.;  $\times 25$ . Günther Sound. Showing the articulation. In this specimen some zoecia have two outer spines, and sometimes the median zoecium is acuminate. Lateral avicularia rare.  
 13. *Bugula Harmsworthii*, sp. nov.;  $\times 8$ . Off Cape Mary Harmsworth.  
 14. *Scrupocellaria scabra* (van Ben.);  $\times 25$ . Off Cape Mary Harmsworth.  
 15. Do. Scutum,  $\times 50$ .  
 16. Do. Dorsal surface showing a vibraculum at the bifurcation, and one to a lower zoecium.  $\times 25$ .

## PLATE 8.

- Fig. 1. *Bugula Harmsworthii*, sp. nov.;  $\times 25$ . Off Cape Mary Harmsworth.  
 2. *Lepralia sincera* (Sm.). Operculum,  $\times 85$ . Off Cape Mary Harmsworth.  
 3. *Membranipora monostachys*, Busk;  $\times 15$ . Near Wilczek Land.  
 4. *Lepralia borealis*, sp. nov.;  $\times 25$ . Specimen mounted in balsam, showing through the semitransparent shell the position of the avicularian chamber. From lat.  $77^{\circ} 55' N.$ , long.  $53^{\circ} 16' E.$   
 5. Do. Operculum,  $\times 85$ .  
 6. Do. Mandible,  $\times 250$ .  
 7. *Pseudofustra palmata* (Sars). Operculum,  $\times 85$ . Lat.  $77^{\circ} 55' N.$ , long.  $53^{\circ} 16' E.$   
 8. Do. Mandible,  $\times 250$ .  
 9. Do. Transverse section, showing the two distal rosette-plates.  
 10. *Membranipora macilenta*, Jullien;  $\times 25$ . Near Wilczek Land.  
 11. *Schizoporella crustacea* (Sm.). Mandible,  $\times 250$ . Günther Sound.  
 12. Do. Operculum,  $\times 85$ .  
 13. Do.;  $\times 50$ . Showing primary zoecium and the three zoecia growing from it. The development of the zoecium on the left has been arrested. Günther Sound.  
 14. *Lepralia porifera* (Sm.). Mandible,  $\times 250$ . From lat.  $77^{\circ} 55' N.$ , long.  $53^{\circ} 16' E.$   
 15. Do. Operculum,  $\times 85$ .

- Fig. 16. *Hippothoa hyalina*, L. Operculum of male zoëcium,  $\times 85$ . From California.
17. Do.; do. Operculum of female zoëcium,  $\times 85$ .
18. Do.; do. Operculum of ovicelliferous zoëcium,  $\times 85$ .
19. *Hippothoa expansa*, Dawson. Operculum,  $\times 85$ . Off Elmwood.
20. *Lepralia hippopus* (Sm.). Operculum,  $\times 85$ . Off Elmwood.
21. *Cribrilina annulata* (Fab.);  $\times 25$ . Off glacier between Cape Flora and Cape Gertrude.
22. *Cribrilina punctata* (Hass.);  $\times 25$ . Lat.  $77^{\circ} 55' N.$ , long.  $53^{\circ} 16' E.$

## PLATE 9.

- Fig. 1. *Schizoporella elmwoodiæ*, sp. nov.;  $\times 25$ .
2. *Myrionozoum coarctum* (Sars);  $\times 25$ . Off Cape Mary Harmsworth, 234 fathoms.
3. Do. (a) Operculum,  $\times 85$ . (b) Mandible,  $\times 85$ .
4. *Myrionozoum subgracile*, d'Orb.;  $\times 25$ .
5. Do. (a) Mandible,  $\times 85$ . (b) Mandible,  $\times 250$ . (c) Operculum,  $\times 85$ .
6. *M. subgracile*, d'Orb. Section of tissue showing the polypides in position, the covering integument (a), over the inner one (b); also the long pore-tubes which in various places have a disk separating the contents on the two sides of the disk. The oral diaphragm is seen as withdrawn.  $\times 25$ .
7. *M. subgracile*, d'Orb. Section through polypide showing *dm*, the diaphragm; *op*, the operculum, with dotted lines to show the position when partly open; *d*, disks in the pore-tubes.  $\times 85$ .
8. *M. subgracile*, d'Orb. End of pore-tube showing the covering integument (a), and the inner one (b),  $\times 500$ . Examined with  $\frac{1}{2}$ -immersion.
9. *M. subgracile*, d'Orb. Covering integument (a).  $\times 85$ .
10. *Schizoporella Harmsworthii*, sp. nov.;  $\times 25$ . Lat.  $77^{\circ} 55' N.$ , long.  $53^{\circ} 16' E.$
11. Do. Tentacular sheath with oral glands attached near the oral aperture, and connected to the lateral walls;  $\times 85$ . (July 13th, 1897.)
12. Do. Oral glands,  $\times 250$ .
13. *Schizoporella elmwoodiæ*, sp. nov. Operculum,  $\times 85$ .

## PLATE 10.

- Fig. 1. *Porella acutirostris*, Sm.;  $\times 25$ . From near Northbrook Island ("L.S.H").
2. Do. Mandible,  $\times 250$ .
3. Do. Operculum,  $\times 85$ .
4. Do. Piece mounted in balsam, showing the avicularian glands through the semitransparent shell,  $\times 50$ .
5. Do. Section of avicularian gland,  $\times 250$ .

- Fig. 6. *Porella inflata*, nom. nov.;  $\times 25$ . From between Cape Flora and Cape Gertrude, 30 fath.
7. Do. Mandible,  $\times 250$ .
8. *Porella saccata*, Busk;  $\times 25$ . From near Wilczek Land, 127 fath. Section showing the position of the oral glands (*gl*), which are behind the tentacles so that they are not seen in the zoecia cut through near the frontal surface; *ov*, ovum.  $\times 25$ .
9. Do. Transverse section showing the large oral glands (*gl*), the avicularian sheath (*av*), the tentacles (*t*), in their sheath, oesophagus (*ø*), cæcum (*c*), testes (*te*).  $\times 50$ .
10. Do. Oral gland,  $\times 250$ . In the upper part the cells are partly absorbed.
11. *Porella saccata*, B. (*elegantula*, B.). Mandible,  $\times 85$ . Off Nova Scotia ('Challenger').
12. Do. Mandible,  $\times 85$ . Near Wilczek Land.
13. *Porella elegantula*, d'Orb. (*perpusilla*, Busk). Mandible,  $\times 85$ . Newfoundland. From d'Orbigny's type-specimen No. 13622, Mus. Nat. Paris.
14. *Porella saccata*, Busk;  $\times 25$ . Specimen boiled in caustic potash, showing the large avicularian chambers, that of the left zoecium has been broken away, also showing the pores at the base of the avicularian chambers. From near Wilczek Land, 127 fathoms.
15. Do. Operculum,  $\times 85$ .
16. Do. Mandible,  $\times 250$ .
17. Do. Diagrammatic section, showing the frontal pore connected through a rosette-plate with the avicularian chamber, which farther down is similarly connected with the zoecium. (*ov.*) ovicell, (*av. ch.*) avicularian chamber, (*z. ch.*) zoecial chamber, (*m.*) mandible, (*op.*) operculum.
18. *Porella elegantula*, d'Orb. Operculum,  $\times 85$ .
19. Do. From the original specimen No. 13622, showing the gigantic avicularia on the left, and pores on the front similar to those of *P. saccata*, Busk.

## PLATE 11.

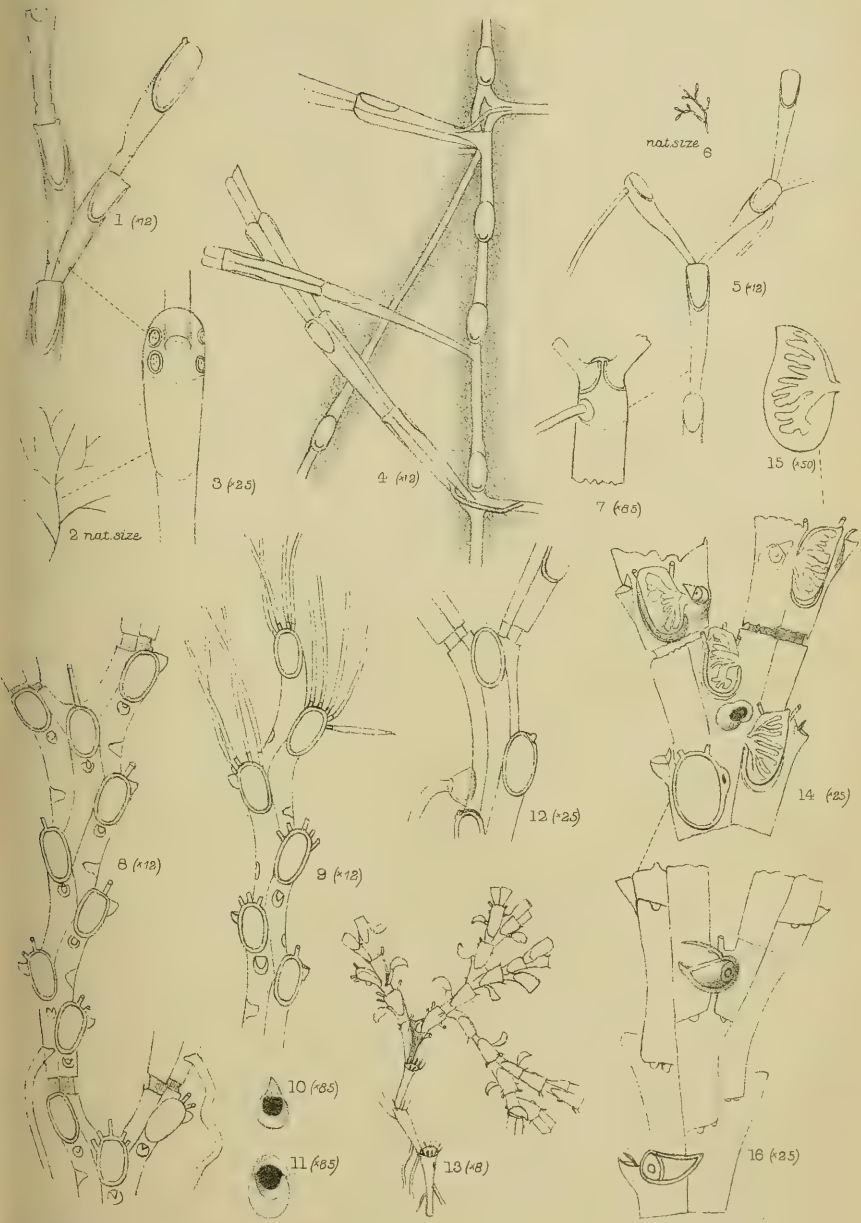
- Fig. 1. *Porella elegantula*, d'Orb. Specimen from Newfoundland named *Eschara elegantula* by d'Orbigny, No. 13622 in the Musée d'Histoire Naturelle. This is only a reproduction of a rough sketch made as a memorandum of the way in which the specimen grew. Nat. size.
2. The *Eschara pavonina* of d'Orbigny, Ile de Ré (Pal. Fr. vol. v. p. 101. No. 13621, Mus. d'Hist. Nat.).
3. *Porella compressa*, Sowerby. Operculum,  $\times 85$ . British specimen.
4. Do. Mandible,  $\times 250$ . British specimen. Identical with Arctic.
5. Do. Calcareous section showing the position of the pore-tubes,  $\times 25$ . Off Cape Mary Harmsworth.
6. *Porella Skenei*, var. *tridens*, Kirch. Operculum,  $\times 85$ . Lat.  $77^{\circ} 55' N.$ , long.  $53^{\circ} 20' E.$
7. Do. Mandibles,  $\times 250$ .

- Fig. 8. *Porella cervicornis*, Pallas. Mandible,  $\times 250$ . Naples.  
 9. *Porella concinna*, Busk. Mandible,  $\times 250$ . Durham.  
 10. Do. Operculum,  $\times 85$ . Durham.  
 11. *Porella plana*, Hincks. Mandible,  $\times 250$ .  
 12. Do. Operculum,  $\times 85$ .  
 13. Do. Operculum,  $\times 50$ . From lat.  $77^{\circ} 55' N.$ , long.  $53^{\circ} 16' E.$   
 14. *Porella lavis*, Flem. Mandible,  $\times 250$ . Shetland.  
 15. *Porella* from Gulf of St. Lawrence (sent as *P. propinqua*, Sm.). Mandible,  $\times 250$ .  
 16. *Porella rostrata*, Hincks. Mandible,  $\times 250$ . Port Phillip Heads.  
 17. *Porella Skeneti*, var. *proboscidea*, Hincks. Mandible,  $\times 250$ . Off Cape Mary Harmsworth.  
 18. Do. Do. Operculum,  $\times 85$ .  
 19. *Porella lorea*, Alder. Mandibles,  $\times 250$ . Shetland.  
 20. Do. Operculum,  $\times 85$ .  
 21. *Escharoides Sarsii*, Sm. Mandible,  $\times 250$ . Off Cape Gertrude and Cape Flora.  
 22. Do. Operculum,  $\times 85$ . Do.  
 23. Do. Mandible,  $\times 250$ . Said to be from the Antarctic, lat.  $74^{\circ} 0' S.$ , long.  $170^{\circ} E.$ ; 330 fathoms.  
 24. *Escharoides rosacea*, Busk. Mandible,  $\times 250$ . Loch Tyne.  
 25. Do. Operculum,  $\times 85$ .  
 26. *Rhaphostomella costata*, Lorenz. Operculum,  $\times 85$ . Off Cape Gertrude and Cape Flora.  
 27. Do. Mandible,  $\times 85$ .  
 28. *Rhaphostomella plicata*, Sm. Operculum,  $\times 85$ .  
 29. Do. Mandible,  $\times 85$ .  
 30. *Rhaphostomella bilaminata*, Hincks. Mandible,  $\times 85$ . Gulf of St. Lawrence.

## PLATE 12.

- Fig. 1. *Rhaphostomella costata*, Lorenz. Section showing the oral glands terminating near the diaphragm,  $\times 85$ . From off Cape Mary Harmsworth.  
 2. Do. Gland,  $\times 250$ . Examined with  $\frac{1}{2}$ -immersion.  
 Figs. 3 & 4. *Phylactella labiata*, Sm. Larva in ovicell,  $\times 85$ . From lat.  $77^{\circ} 55' N.$ , long.  $53^{\circ} 16' E.$  July 13th.  
 Fig. 5. *Schizoporella unicornis*, Johnst.,  $\times 85$ . Free swimming larva from Trieste, for comparison of the size.  
 6. *Microporella spatulifera* (Sm.),  $\times 85$ .  
 7. *Smittia Landsborovii*, Johnst., var.,  $\times 25$ .  
 8. *Retepora cellulosa* (L.). Operculum,  $\times 85$ . Off Cape Mary Harmsworth.  
 9. Do. Mandible,  $\times 85$ .  
 10. *Cellepora ventricosa*, Lorenz. Operculum,  $\times 85$ .  
 11. *Cellepora incrassata*, Sm. Operculum,  $\times 85$ . From Greenland.  
 12. Do. Vicarious mandible,  $\times 85$ .

- Fig. 13. *Cellepora incrassata*, Sm. Vicarious mandible,  $\times 85$ . From same specimens as figs. 11 & 12.
14. Do. Lateral oral mandible,  $\times 85$ . From near Wilczek Land.
15. *Cellepora pumicosa*, Busk. Mandible,  $\times 85$ . Lat.  $77^{\circ} 55' N.$ , long.  $55^{\circ} 25' E.$
16. Do. Operculum,  $\times 85$ .
17. *Smittia ventricosa* (Hass.), var.,  $\times 25$ . Off glacier between Cape Flora and Cape Gertrude.
18. *Smittia Jacksonii*, nom. nov. Mandible,  $\times 85$ . Lat.  $77^{\circ} 55' N.$ , long.  $55^{\circ} 25' E.$
- Figs. 19, 20. *Smittia lamellosa* (Sm.). Operculum and mandible.  $\times 85$ .
- Fig. 21. Do. Do.  $\times 25$ .
22. *Porella obesa*, sp. nov. Mandible,  $\times 250$ .
23. Do. Operculum,  $\times 85$ .
24. Do.,  $\times 25$ . Off Elmwood.

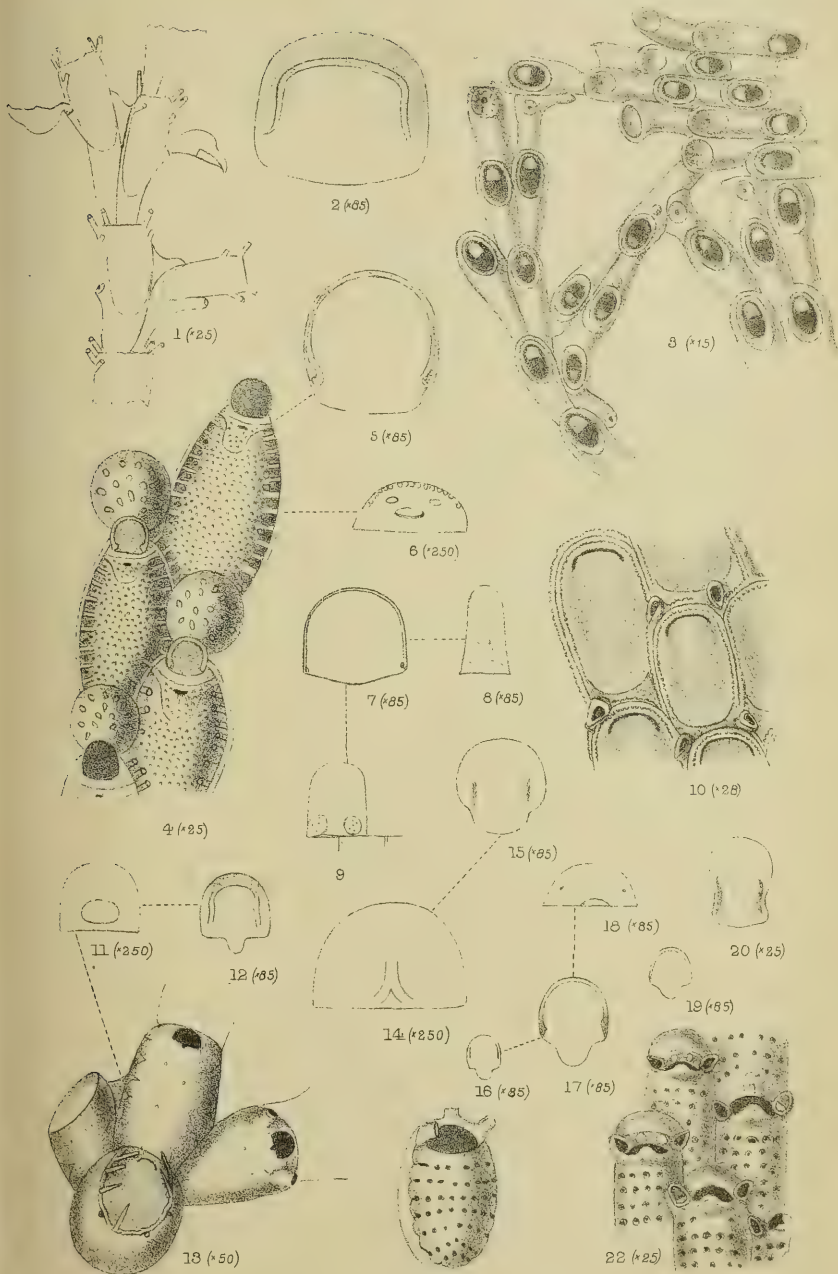


A.W. Waters del  
A.T. Hollick lith.

West, Newman, imp.

BRYOZOA FROM FRANZ-JOSEF LAND

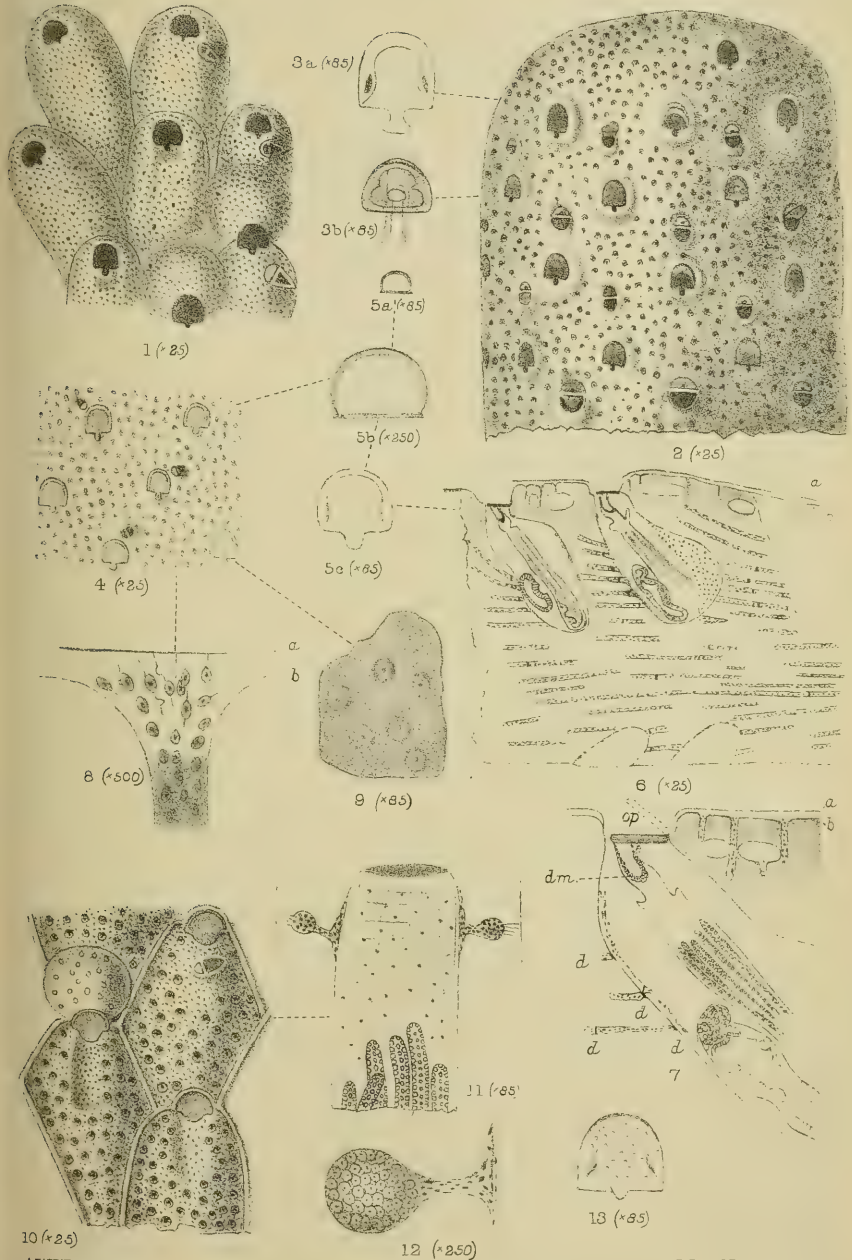




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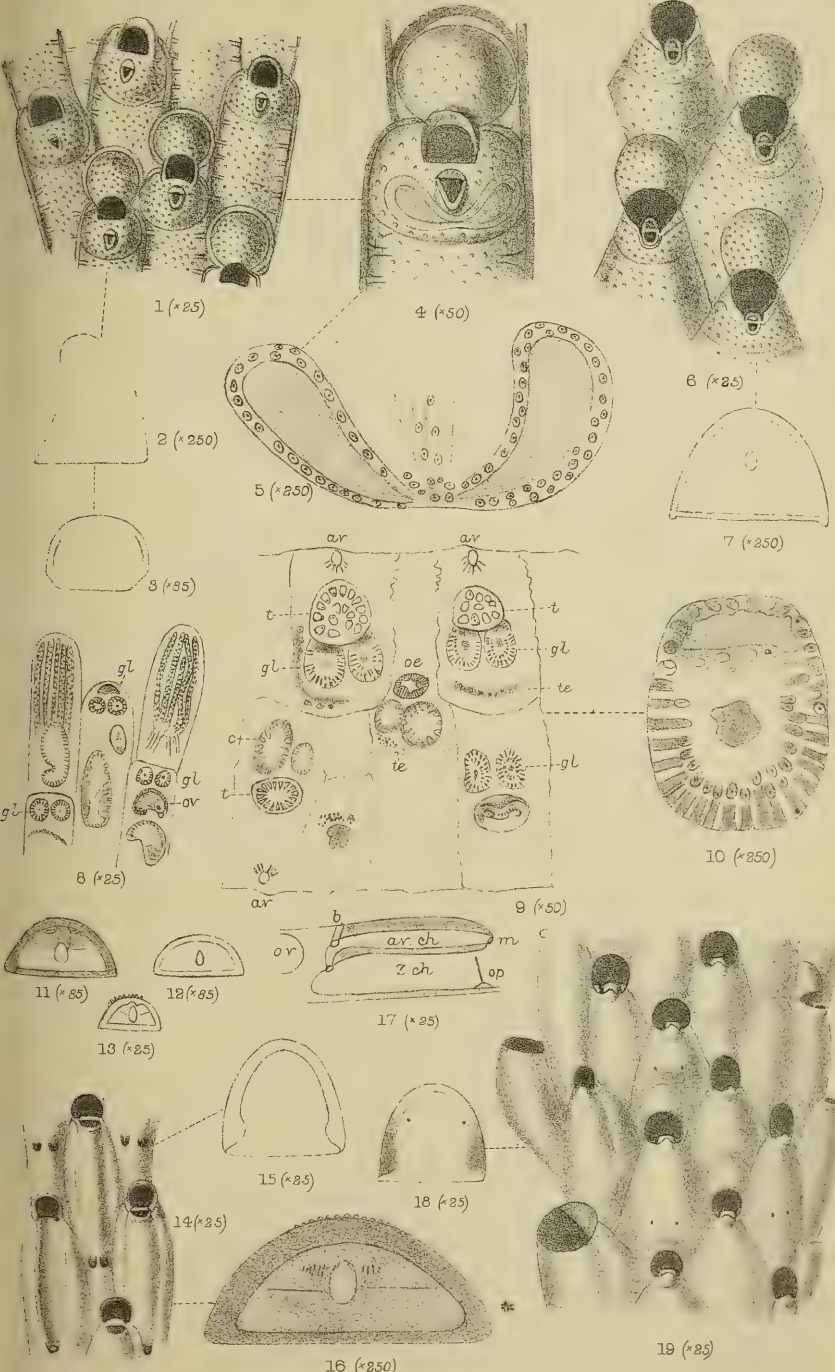
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A.T. Hollick lith.

West, Newman imp.

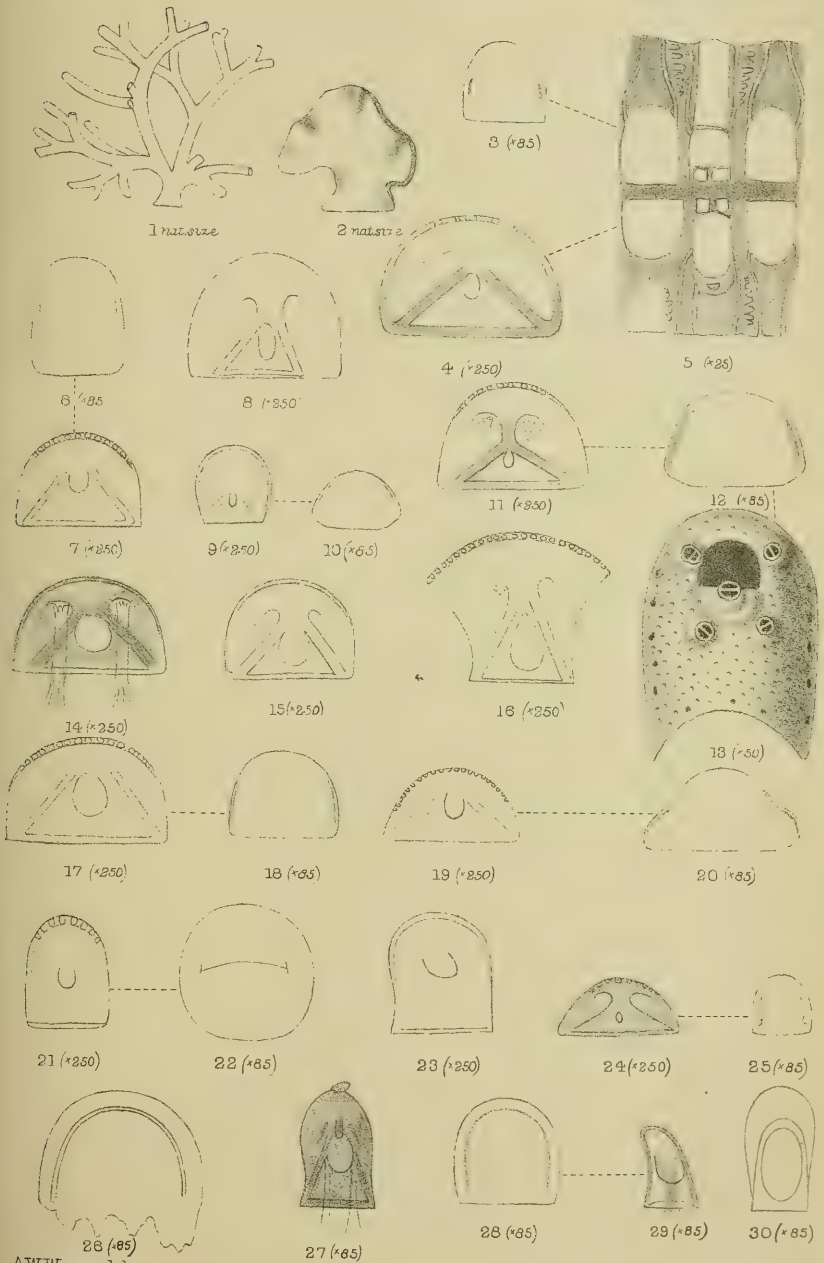
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A.W. Waters del.  
A.T. Hollick lith.

West, Newman imp

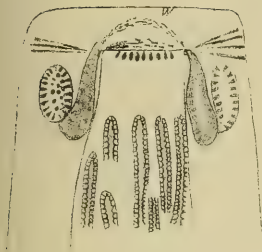
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AW. Waters del.  
A.T. Hollick lith.

West, Newman imp.

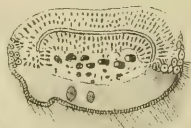
BRYOZOA FROM FRANZ-JOSEF LAND.



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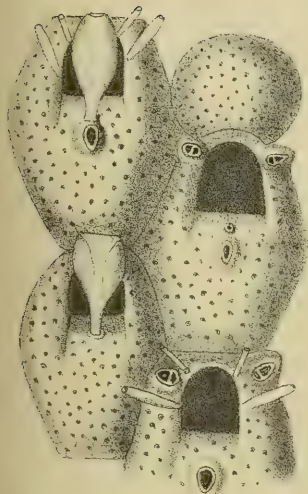
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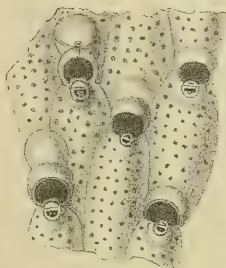
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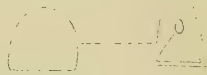
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7 (\*25)



5 (\*85)



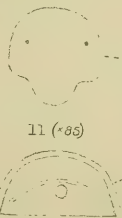
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9 (\*85)



10 (\*85)



11 (\*85)



13 (\*85)



15 (\*85)



16 (\*85)



12 (\*85)



22 (\*250)



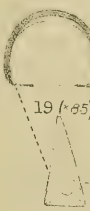
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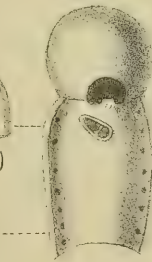
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18 (\*85)



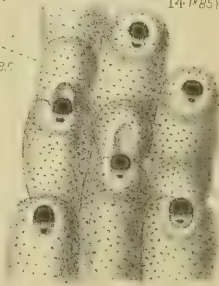
19 (\*85)



21 (\*25)



23 (\*85)



24 (\*25)

AWaters del.  
A.T.Hollick lith.

West, Newman imp.

- Fig. 13. *Cellepora incrassata*, Sm. Vicarious mandible,  $\times 85$ . From same specimen as figs. 11 & 12.
14. Do. Lateral oral mandible,  $\times 85$ . From near Wilczek Land.
15. *Cellepora pumicosa*, Busk. Mandible,  $\times 85$ . Lat.  $77^{\circ} 55' N.$ , long.  $55^{\circ} 25' E.$
16. Do. Operculum,  $\times 85$ .
17. *Smittia ventricosa* (Hass.), var.,  $\times 25$ . Off glacier between Cape Flora and Cape Gertrude.
18. *Smittia Jacksonii*, nom. nov. Mandible,  $\times 85$ . Lat.  $77^{\circ} 55' N.$ , long.  $55^{\circ} 25' E.$
- Figs. 19, 20. *Smittia lamellosa* (Sm.). Operculum and mandible.  $\times 85$ .
- Fig. 21. Do. Do.  $\times 25$ .
22. *Porella obesa*, sp. nov. Mandible,  $\times 250$ .
23. Do. Operculum,  $\times 85$ .
24. Do.,  $\times 25$ . Off Elmwood.

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Observations on *Syllis vivipara*, Krohn.  
By EDWIN S. GOODRICH, M.A., F.L.S.

[Read 7th June, 1900.]

(PLATE 13.)

WHILST working last winter at the Zoological Station in Naples, I found in the tank of the large laboratory an interesting small Syllid, which I believe to be the *Syllis vivipara* originally named by Krohn in 1869 (2).

Since Krohn gave but a very brief description of his worm, without figures, merely stating that in general structure it closely resembles Claparède's *Syllis Armandi* (probably *S. prolifera*, Krohn), it is by no means easy to make certain whether we are really dealing with his species. The worm reaches to a length of 2 cm., and appears pale yellow in colour owing to the intestine, which is seen through the transparent and almost colourless body-wall (Pl. 13. fig. 1). The palps are joined together below the prostomium for about half their length (figs. 1 & 2). The dorsal cirri are of considerable length, especially in the anterior region (fig. 1). As Krohn mentions, the terminal joint of the chætæ are provided with a single hook (fig. 6).

Internally, the alimentary canal is of quite normal structure. The pharynx possesses a single tooth, and nine papillæ at its anterior end (figs. 1 & 3).